MARYLAND

# CHART PROGRAM

## ATMS R18.1

## DETAILED DESIGN

Version 1.0
Work Order 14 Deliverable 12
Doc# WO14-ATMS-RD-002

**Date: August 1, 2017**

**Prepared by:** CSRA

**Approved via separate Deliverable Acceptance Form per RFP section 3.9.2**

# Revision History

| Date | Version | Description | Pages Affected | Author |
|---|---|---|---|---|
| 08/01/2017 | 1.0 | Initial release of WO14 Streaming Video Player Upgrade Phase 2 ATMS R18.1 | All | ATMS Team |
| | | | | |

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# 1INTRODUCTION

## 1.1 Purpose and Scope

### 1.1.1 Purpose

This document describes the design of the software for CHART ATMS Release 18.1. The CHART ATMS R18.1 release provides the features listed below. These features are being developed under work order WO 14.

**ATMS-3108: ATMS GUI: Replace JWPlayer with VideoJS:**

The ATMS GUI needs to be changed to use VideoJS instead of JWPlayer.

For low-latency video needed for camera control, the RTMP protocol is still being used, requiring the VideoJS-Flash plugin, which still requires Adobe Flash Player to be used. Compared with JWPlayer, VideoJS eliminates the need for a commercial license, and removes the implicit Internet calls (a.k.a., the "phone home" functionality) that JWPlayer used. Also, it provides a good likelihood of having an upgrade path if or when MDSHA moves away from the RTMP protocol, and Skyline may also develop a plugin for VideoJS to support the next protocol of choice.

### 1.1.2 Scope

The main objective of this detailed design document is to provide software developers with a framework in which to implement the requirements identified in the CHART ATMS R18.1 Requirements document. A matrix mapping requirements to the design is presented in Appendix A (Mapping to Requirements).

## 1.2 Project Executive Summary

The main objective of this detailed design document is to provide software developers with a framework in which to implement the requirements identified in the CHART ATMS R18.1 Requirements document. The overall contents of ATMS Release 18.1 are summarized in Section 1.1.1.

### 1.2.1 Design Process

The design was created by capturing the requirements of the system in UML Use Case diagrams. Class diagrams were generated showing the high-level objects that address the Use Cases. Sequence diagrams were generated to show how each piece of major functionality will be achieved. This process was iterative in nature – the creation of sequence diagrams sometimes caused re-engineering of the class diagrams and vice versa.

This release focused on re-implementing existing capabilities using a new COTS product so the design process was not applicable.

### 1.2.2 Design Tools

Any Class, Use Case, or Sequence Diagrams contained within this design were extracted from the Enterprise Architect design tool.

This is not applicable for the current release, as there are no applicable design diagrams.

### 1.2.3 Work Products

The final CHART ATMS Release 18.1 design consists of the following work products:

- Human-Machine Interface section which provides descriptions of the screens that are changing or being added in order to allow the user to perform the described uses.
- **N/A for R18.1:** UML Class diagrams, showing the software objects which allow the system to accommodate the uses of the system described in the Use Case diagrams
- **N/A for R18.1:** UML Sequence diagrams showing how the classes interact to accomplish major functions of the system

Requirement Verification Traceability Matrix that shows how this design meets the documented requirements and use-cases for this feature

### 1.2.4 System Overview

The CHART ATMS is a set of software programs used to identify and track traffic flow disruptions, send responders to correct the disruption and notify the public using Dynamic Message Signs (DMSs) and Highway Advisory Radios (HARs), and send notifications to the media and feeding data to a live traffic website (http://www.traffic.maryland.gov) and Maryland 511. The system runs on a combination of Windows 2008 Servers, connected to a statewide network of Closed Circuit Television (CCTV) cameras, overhead and portable DMSs, HARs, Traffic Sensor Systems (TSSs) (microwave traffic flow detectors), remote weather stations, and On/Off devices (electronic relay devices such as for horns and fog beacons). It is. The software is built using Java and C++ and connects to a Microsoft SQL Server database. Interprocess communications are achieved using an industry standard CORBA (Common Object Request Broker Architecture) package and web services (typically Extensible Markup Language (XML) over Hyper Text Transfer Protocol (HTTP)). A web-based Graphical User Interface (GUI) is connected to the CHART ATMS services using CORBA listeners and provides full CHART ATMS functionality to authorized users over a browser. The system provides data to interested parties via multiple systems both inside and outside the CHART Program umbrella, including CHART's own CHARTWeb public website and the CHART Mapping Intranet Map (both part of CHART), Maryland 511 (MD511) (not part of CHART but falls under the purview of the State Highway Administration (SHA)), and the Regional Integrated Transportation Information System (RITIS) at the University of Maryland (largely independent of SHA). This data is provided by means of two data exporter services (one internal, one external). The CHART

Program provides data which is originally created via the CHART ATMS through a secure connection to the MDOT network, by providing a secure Geographic Information System export and by providing Really Simple Syndication (RSS) XML feeds on the internet. CHART ATMS and the CHART Program as a whole provide video by transcoding the statewide video and feeding it in multiple video formats through the MDOT internal network, the Statewide Government Intranet (SwGI) and the internet.

Figure 1-1 provides an overall CHART systems architecture. Figure 1-2 provides an overall CHART ATMS architecture.

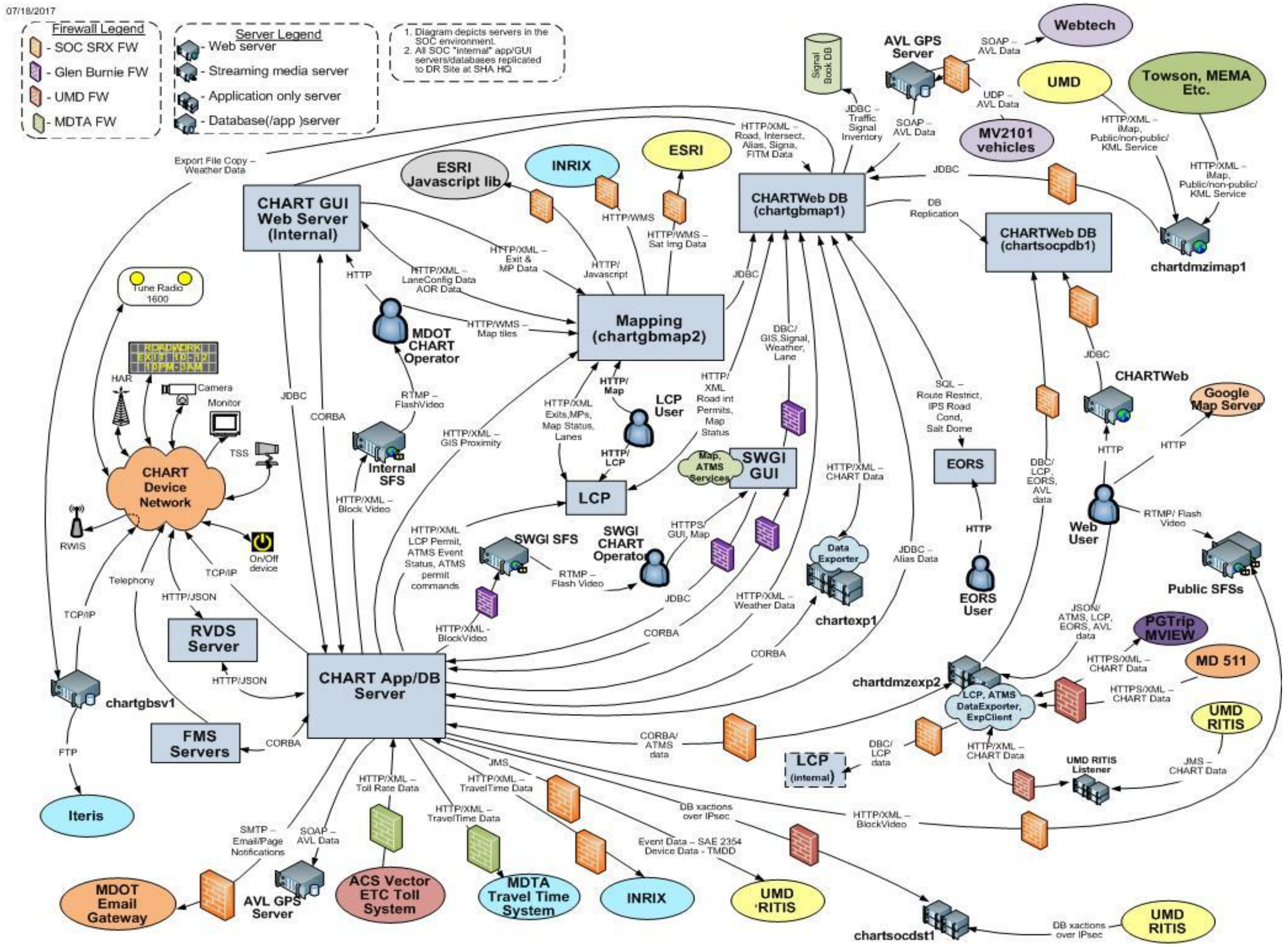


Figure 1-1. CHART and External Interfaces

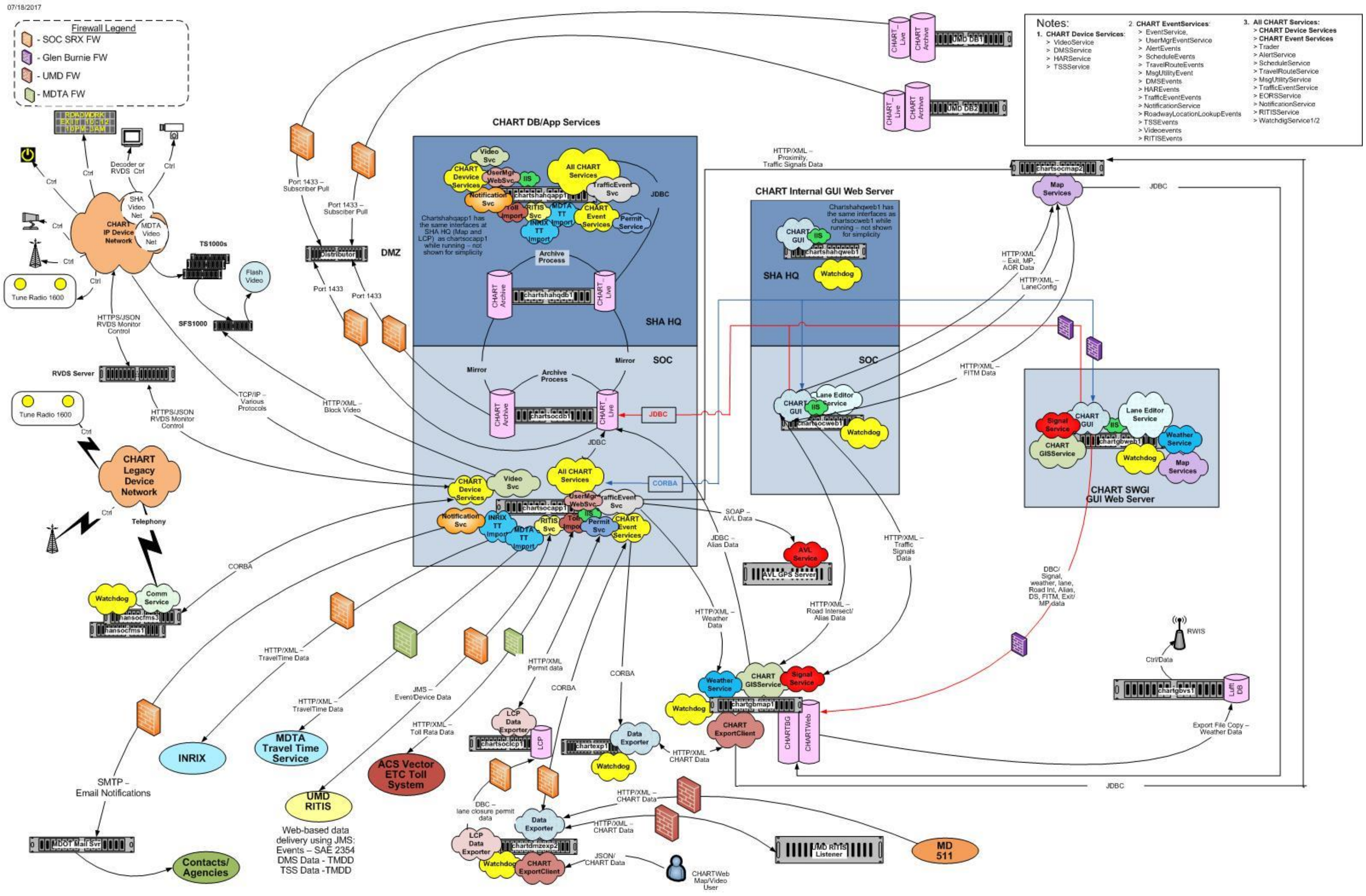


Figure 1-2. ATMS Detailed Architecture

A matrix mapping requirements to the design is presented in Appendix A (Mapping to Requirements).

### 1.2.5 Design Constraints

No design constraints have been identified for R18.1.

### 1.2.6 Future Contingencies

No future contingencies have been identified for R18.1.

## 1.3 Document Organization

Section 1 of this document is the introduction.
Section 2 describes the system architecture.
Section 3 describes the file and database design.
Section 4 describes the human –machine interface
Section 5 describes the detailed design with additional detailed content (detailed diagrams)
Section 6 describes the interfaces external to ATMS.
Section 7 describes the system integrity controls.

## 1.4 Points of Contact

The key members of the staff are listed below:

CSRA Operations Manager: Sam Jallad (410-872-2120)
CSRA Program Manager: Laura Nicholas (678-861-6569)
CSRA Release Manager: Gary Krebs (678-838-9935)
System Administrator: Kenny Gross (410-582-5680)
Application Delivery Manager: Chris Brennan (410-872-2124)
ATMS Development Lead: Scott Dalrymple (410-872-2128)
Database Administrator: Nick Posteraro (410-872-2125)
Configuration Manager: Delena McFadden-Mello (410-872-2122)
Configuration Manager: Mike Fleming (410-872-2127)
System Test: Mike Sluder (410-872-2129)
System Test: Asha Khatri (410-872-2130)
CHART Project Manager: Dale Lineweaver (410-582-5695)
CHART Program Administrator: Rick Dye (410-582-5619)

## 1.5 Project References

The following are the list of the relevant ATMS R18.1 documents. Note that not all are updated for these specific releases:

1. *CHART Program WO 14 ATMS Release 18.1 Software Requirements*, June 22, 2017, WO14-ATMS-RD-001-V1.0

## 1.6 Glossary

| TERM | DESCRIPTION |
|---|---|
| AJAX | Asynchronous Javascript and XML (or JSON) |
| AOR | Area of Responsibility representing an area that a person, user, operations center, etc. is responsible for |
| API | Application Programming Interface |
| ATMS | Advance Traffic Management System |
| CHART | Coordinated Highways Action Response Team |
| CORBA | Common Object Request Broker Architecture |
| CCTV | Closed Circuit Television |
| COTS | Commercial Off The Shelf [software or equipment] |
| CRUD | Create, Read, Update, and Delete (the four standard actions which can be performed on a database table) |
| DBMS | Database Management System |
| DMS | Dynamic Message Sign, an electronic sign used to display information to the traveling public |
| DTMF | Dual Tone Multi-Frequency (touchtone telephone signaling system) |
| Dynamic Message Sign | An electronic sign used to provide messages to motorists |
| ERD | Entity Relationship Diagram used to show the relationship between tables in an RDBMS |
| FMS | Field Management System |
| Functional Right | A user right, granted to CHART users via Roles. Each operation on a device, including the ability to configure a device, view its sensitive information, and issue commands to the device are controlled by user rights. Users must possess the proper right to be able to perform these actions. |
| GB | Gigabytes |
| GIF | Graphic Interchange Format (picture file) |
| GIS | A Geographic Information System (GIS) is any system that captures, stores, analyzes, manages, and presents data that are linked to location |
| GUI | Graphical User Interface |
| HAR | Highway Advisory Radio, a radio station used to broadcast programmable messages to motorists and other travelers regarding traffic and other delays |
| HTML | HyperText Markup Language |
| HTTP | HyperText Transfer Protocol |
| IDL | Interface Definition Language, which describes CORBA interfaces |
| JAXB | Java API for XML Binding |
| JDBC | Java Database Connectivity |
| JDOM | Java Document Object Model |
| JNI | Java Native Interface, a means of interfacing Java programs with languages written in other languages, such as C++ |
| JRE | Java Runtime Environment |
| JSON | JavaScript Object Notation |
| JTS | Java Topology Suite |

| TERM | DESCRIPTION |
|---|---|
| KB | Kilobytes |
| LCP | Lane Closure Permit, a permit for the closure of a road for maintenance, or the system used to manage those permits |
| MB | Megabytes |
| MSSQL | Microsoft SQL [Server], the DBMS used in CHART |
| NSIS | Nullsoft Scriptable Installation System |
| PDF | Portable Document Format |
| PR | Problem Report |
| RDBMS | Relational DBMS |
| REST | Representational State Transfer |
| RPC | Remote Procedure Call |
| RV | Recreational Vehicle |
| RVDS | Remote Video Display Solution |
| SDK | Software Development Kit |
| SFS | Streaming Flash Server |
| SHA | State Highway Administration |
| SNMP | Simple Network Management Protocol |
| SOC | Statewide Operations Center |
| SQL | Structured Query Language |
| TSS | Traffic Sensor System |
| UCD | Use Case Diagram. Depicts a collection of Use Cases. |
| UML | Unified Modeling Language |
| XML | Extensible Markup Language |
| VSD | Video Streaming Device, part of the RVDS |
| VSS | Video Streamer Service, part of the RVDS |

# 2 SYSTEM ARCHITECTURE

The sections below discuss specific elements of the architecture and software components that are created, changed, or used in CHART ATMS Release 18.1.

## 2.1 System Hardware Architecture

There are no changes to the system hardware architecture for CHART ATMS Release 18.1.

## 2.2 System Software Architecture

CHART ATMS uses the Common Object Request Broker Architecture (CORBA) as the base architecture, with custom built software objects made available on the network allowing their data to be accessed via well-defined CORBA interfaces. Communications to remote devices use the Field Management Server (FMS) architecture. Newer external interfaces such as the User Management web service, Data Exporter, and GIS service employ a web services architecture combining an HTTP request/response structure to pass XML messages.

Except where noted in the subsections below, CHART ATMS Release 18.1 features do not impact the software architecture of the CHART ATMS.

### 2.2.1 COTS Products

CHART ATMS uses numerous COTS products for both run-time and development. Table 2-1 contains existing and new COTS products. For R18.1, JWPlayer (proprietary) is replaced with VideoJS (open source).

***Table 2-1. ATMS COTS Products***

| Product Name | Ver | Description/Purpose | Redistributability | Usage |
|---|---|---|---|---|
| Adobe Flash Player | >= 9.0.27.0 | Flash Player is needed to view desktop video streams in the CHART ATMS GUI. This is dictated by the use of the RTMP protocol for low-latency video streaming, which is a Flash-based protocol. As of R18, Flash Player is not used for any other function in the ATMS GUI. | Proprietary | Runtime |
| Angular Java Script Library | 1.6.1 | The CHART ATMS GUI uses the Angular JavaScript Library, a cross-browser compatible JavaScript library, primarily for specialty gui controls. | Open source | Development |
| Apache ActiveMQ | 5.5 | CHART ATMS uses ActiveMQ to connect to RITIS JMS queues for import from RITIS and to export to CHARTWeb for CHART Mapping / CHARTWeb and to RITIS and MD511. | Open source | Runtime |

| Product Name | Ver | Description/Purpose | Redistributability | Usage |
|---|---|---|---|---|
| Apache Ant | 1.9.6 | CHART ATMS uses Apache Jakarta Ant to build CHART applications and deployment jars. | Open source | Development |
| Apache Commons Lang3 | 3-3.3.2 | CHART uses commons-lang for various string utility methods provided by this library. For example, RandomStringUtils class is used to generate random passwords for password reset requests. | Open source | Development |
| Apache Log4j | 1.2.15 | CHART uses log4j for logging purposes | Open Source | Development |
| Apache Tomcat | 8.0.30 | CHART ATMS uses Apache Tomcat as its web server container. This is used to host the CHART ATMS GUI and all the various CHART ATMS Web Services. The 64-bit (x64) build is used if hosting the GUI and Lane Editor Service only; if any other services are hosted, the 32-bit (x86) build is used. | Open source | Runtime |
| Apache XML-RPC | 3.1.2 | CHART ATMS uses the apache xmlrpc java library that uses XML over HTTP to implement remote procedure calls. The video Flash streaming “red button” (“kill switch”) API uses XML over HTTP remote procedure calls. | Open source | Runtime |
| CLOC (Count Lines of Code) | 1.7.2 | Source code counting tool | Open source | Administrative |
| Core Tec Decoder Control | 1.0 | CHART ATMS uses a Core Tec supplied decoder control API for commanding Core Tec decoders. | Proprietary | Runtime<br>Development |
| Datatables JavaScript Library | 1.10.13 | The CHART ATMS GUI uses the Datatables JavaScript Library, a cross-browser compatible JavaScript library, which provides many features, which provide easy support for display of tabular data.. | Open source | Development |
| Dialogic API | 6.0 | CHART ATMS uses the Dialogic API for sending and receiving Dual Tone Multi Frequency (DTMF) tones for HAR communications. | Proprietary | Runtime<br>Development |
| Eclipse | 4.4 and higher | The standard Java development environment. CHART ATMS developers collectively use a variety of versions and are free to update at their discretion. However, 4.4 is the minimum required to support Java 8 | Open source | Development |

| Product Name | Ver | Description/Purpose | Redistributability | Usage |
|---|---|---|---|---|
| GIF89 Encoder | 0.90 beta | Utility classes that can create .gif files with optional animation. This utility is used for the creation of DMS True Display windows. | Open source | Development |
| GNU Bison | 2.1 | CHART ATMS uses Bison and Flex as part of the process of compiling binary macro files used for performing camera menu operations on Vicon Surveyor VFT cameras. | Open source | Development |
| GNU Flex | 2.5.4a-1 | CHART ATMS uses Bison and Flex as part of the process of compiling binary macro files used for performing camera menu operations on Vicon Surveyor VFT cameras. | Open source | Development |
| iText | 2.1.7 | CHART ATMS uses iText for PDF document generation | Proprietary | |
| Jackson | 2.1.0 | CHART ATMS uses the Jackson Java library to encode/decode strings that use JSON (JavaScript Object Notation). | Open source | Runtime |
| JacORB Event Service | 2.3.1 (as patched for CHART ATMS) | CHART ATMS uses a compiled, patched version of JacORB 2.3.1. The JacORB source code, including the custom patched code updated by the CHART ATMS software development team, is kept in the CHART ATMS source repository. | Open source (enhanced with custom CHART ATMS patches) | Runtime<br>Development |
| JacORB ORB | | | | |
| JacORB Trader | | | | |
| Java Runtime Environment (JRE) | 1.8.0_74 (a.k.a. 8u74) | The Java Runtime Environment (JRE) is the runtime environment for the CHART ATMS. | Open source | Runtime<br>Installation |
| JavaHelp | 1.1 | The JavaHelp system is used to develop the online help system for the CHART ATMS. The text thus developed for the online help is also ported verbatim into the CHART ATMS User's Guide. | Open source | Development<br>Runtime |
| JavaMail | 1.4.4 | The CHART ATMS Notification Service uses this API to deliver SMTP mail (notifications). | Open source | Development<br>Runtime |
| Java SDK | 1.8.0_74 (a.k.a. 8u74) | The Oracle Java Software Development Kit (SDK) is the Java compiler for the CHART ATMS. | Open source | Runtime<br>Installation |

| Product Name | Ver | Description/Purpose | Redistributability | Usage |
|---|---|---|---|---|
| JavaService | 2.0.10.0 | CHART ATMS uses JavaService to install the server side Java software components as Windows services. | Open source | Runtime |
| Java Topology Suite (JTS) | 1.8.0 | CHART ATMS uses the Java Topology Suite (JTS) for geographical utility classes. | Open source | Runtime<br>Development |
| JAXB | hudson-jaxb-ri-2.1-833 | CHART ATMS uses the jaxb Java library to automate the tedious task of hand-coding field-by-field XML translation and validation for exported data. | Open source | Runtime<br>Development |
| Jaxen | 1.0-beta-8 dated 2002-01-09 | The Jaxen project is a Java XPath Engine. Jaxen is a universal object model walker, capable of evaluating XPath expressions across multiple models. | Open source | Runtime<br>Development |
| JDOM | b7 (beta-7) dated 2001-07-07 | CHART ATMS uses JDOM as a way to represent an XML document for easy and efficient reading, manipulation, and writing. | Open source | Development |
| JIRA | 6.4.11 | The CHART Program uses JIRA for tracking problem reports (PRs) | Proprietary | Development |
| joeSNMP | 0.2.6 dated 2001-11-11 | The joeSNMP project is a Java-based implementation of the SNMP protocol. CHART ATMS uses for commanding Impath MPEG-2 decoders and for communications with NTCIP DMSs. | Open source | Runtime<br>Development |
| JQuery JavaScript Library | 3.1.1 | The CHART ATMS GUI uses the JQuery JavaScript Library, a cross-browser compatible JavaScript library, which provides many features, including easy Ajax support. | Open source | Development<br>Runtime |
| JQuery-UI JavaScript Library | 1.12.1 | The CHART ATMS GUI uses the JQuery-UI JavaScript Library, a cross-browser compatible JavaScript library, which provides many features, primarily for specialty gui controls including tabbed displays. | Open source | Development<br>Runtime |
| JSON-simple | 1.1 | CHART ATMS uses the JSON-simple Java library to encode/decode strings that use JSON (JavaScript Object Notation). | Open source | Runtime<br>Development |

| Product Name | Ver | Description/Purpose | Redistributability | Usage |
|---|---|---|---|---|
| Microsoft SQL Server | 2008 R2 and 2005 | CHART ATMS uses Microsoft SQL Server 2008 to host its databases. It uses the same version for retrieving roadway location, weather, and traffic signal data from CHART Mapping and lane closure permits from LCP. The reporting component EORS v2 uses SQL Server 2005. | Proprietary | Runtime |
| Microsoft SQL Server JDBC Driver | 4.0 | CHART ATMS Java software accesses the Microsoft SQL Server database using the JDBC Driver 4.0 produced by Microsoft for this purpose. | Proprietary | Development<br>Runtime |
| Microsoft Visual C++ | 6, Service Pack (SP) 6 | Although for the most part CHART ATMS has migrated to Visual Studio 2012 Ultimate for C++, CHART ATMS still uses Visual C++ Version 6, Service Pack 6 C++ library files for the previously compiled legacy V1500 Manager. Necessary library files are used in the runtime environment. | Proprietary | Runtime |
| Microsoft Visual Studio | 2012 Ultimate | CHART ATMS uses Microsoft Visual Studio 2012 Ultimate for C++ source code development. Necessary library files are used in the runtime environment. These include elements of earlier versions as well (2010, 2008, and 2005). | Proprietary | Development<br>Runtime |
| Microsoft Windows | 2008 Server | CHART ATMS uses Microsoft Windows 2008 Server as its standard runtime platform for the CHART ATMS application servers, database servers, FMS servers, and GUI servers. | Proprietary | Runtime |
| NeoSpeech | 3.11.5 | Text to Speech Engine | Proprietary | Runtime |
| Nullsoft Scriptable Install System | 2.20 | CHART ATMS uses the Nullsoft Scriptable Install System (NSIS) as the installation package for CHART NTCIP Conformance Test components, for NTCIP DMS and NTCIP cameras. | Open source | Development<br>Installation |

| Product Name | Ver | Description/Purpose | Redistributability | Usage |
|---|---|---|---|---|
| OpenLayers | 2.13.1 | The CHART ATMS Map feature uses the OpenLayers JavaScript API 2.8 (http://openlayers.org/) in order to render interactive maps within a web application without relying on vendor specific software. OpenLayers is an open source product released under a BSD style license which can be found at (http://svn.openlayers.org/trunk/openlayers/license.txt). | Open source | Development<br>Runtime |
| O'Reilly Servlet | 1.11 | Provides classes that allow the CHART ATMS GUI to handle file uploads via multi-part form submission. | Open source | Development<br>Runtime |
| Prototype JavaScript Library | 1.7.2 | The CHART ATMS GUI uses the Prototype JavaScript Library, a cross-browser compatible JavaScript library, which provides many features, including easy Ajax support. | Open source | Development<br>Runtime |
| RedGate SQL Backup Pro | 6 | CHART ATMS uses these parts of the RedGate DBA Bundle monitoring tools to support the backup and restore processes and to monitor database performance | Proprietary | Runtime |
| RedGate SQL Monitor | 2.3.0 | | | |
| Robohelp | 10 | CHART ATMS developers use Robohelp to author the online help and to generate the CHART ATMS User's Guide, which is a Word document generated from the online help. | Proprietary | Development |
| SAXPath | 1.0-beta-6 dated 2001-09-27 | CHART ATMS uses SAXPath, an event-based API for XPath parsers, that is, for parsers which parse XPath expressions. | Open source | Runtime<br>Development |
| Sparx Enterprise Architect | 9.3.934 | CHART ATMS developers use Enterprise Architect by Sparx for UML modeling and design tool. | Proprietary | Development |
| Subversion | 1.6 | CHART ATMS uses Apache Subversion for source code control. | Open source | Development |
| Subversion browser TortoiseSVN | 1.6.15 | Official CHART ATMS builds use TortoiseSVN subversion browser.  Some developers may use TortoiseSVN as well. | Open source | Development |

| Product Name | Ver | Description/Purpose | Redistributability | Usage |
|---|---|---|---|---|
| Tritonus | 0.3.6 | The CHART ATMS uses the Tritonus implementation of the Java Sound API for manipulating audio files. | Open source | Development<br>Runtime |
| Turnkey-RVDS | 2.0.4 | The CHART ATMS uses the Turnkey-RVDS to display Streaming Flash video on physical monitors. | Proprietary | Runtime |
| Velocity Template Engine | 1.6.1 | Provides classes that CHART ATMS GUI uses in order to create dynamic web pages using velocity templates. | Open source | Runtime<br>Development |
| VideoJS | 6.2.0 | VideoJS is used in the CHART ATMS GUI to display streaming video. Additional subcomponents are needed to support the RTMP streams used in CHART: the videojs-flash 2.0.0 plugin, and a customized version of the videojs-swf 5.4.0 Flash binary (customized to support bufferTime configurability). | Open source | Runtime<br>Development |
| vRanger Backup & Replication | 5.3.1 | The CHART Program uses vRanger Backup & Replication by Quest Software to maintain system backups. This subsystem is not part of the CHART ATMS per se, but serves in a support role. Therefore it is listed as having Administrative usage, rather than Runtime usage. | Proprietary | Administrative |
| XML Spy | 2009 Pro SP 1 | CHART ATMS developers use XMLSpy to visualize, edit, and generate XML and XSLT used by the CHART ATMS and by some of the external systems which interface with the CHART ATMS. | Proprietary | Development |

### 2.2.2 Component Deployment

The diagram below describes the expected deployment of ATMS components.

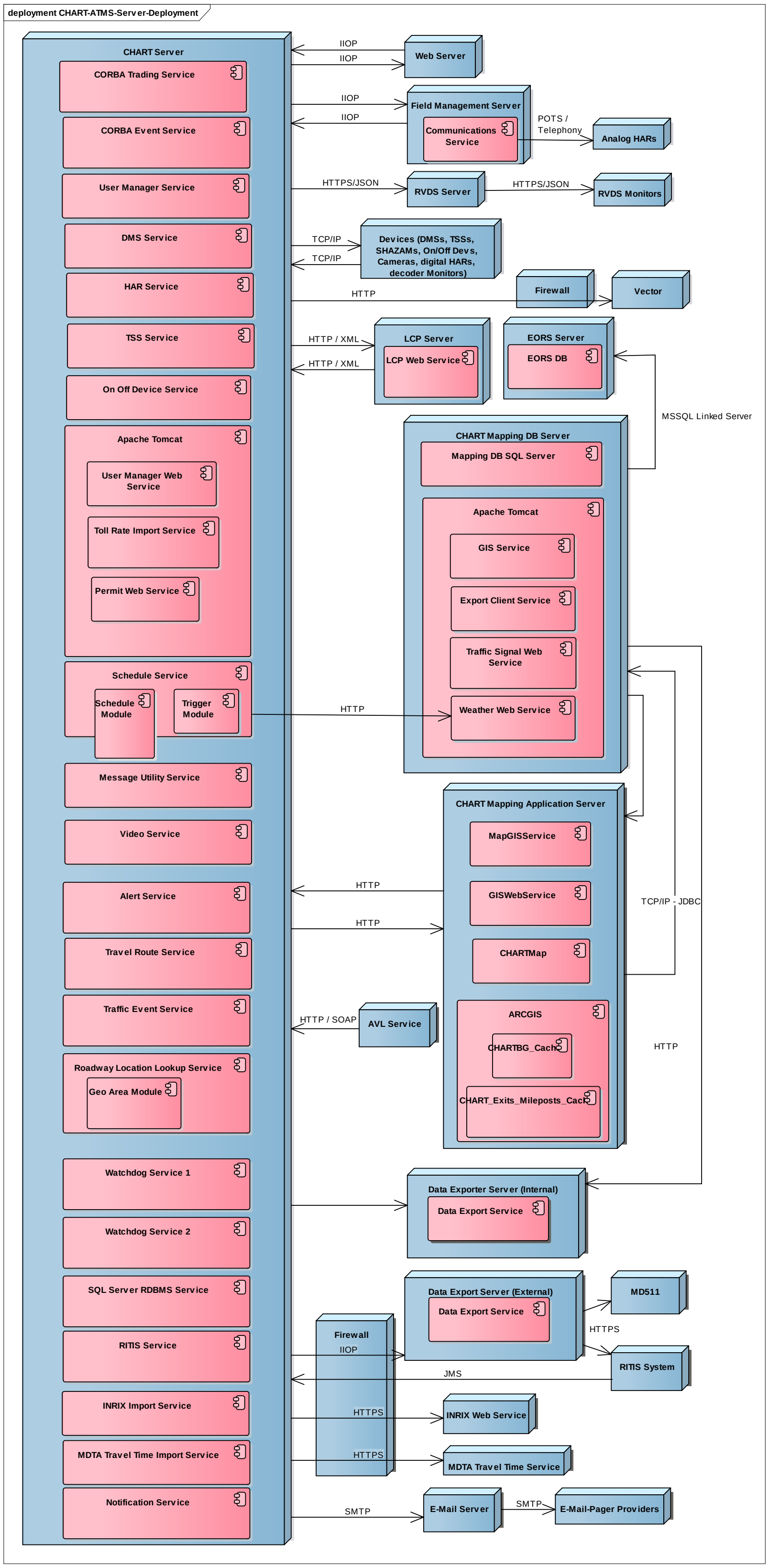


Figure 2-1. R18.1 Server Deployment

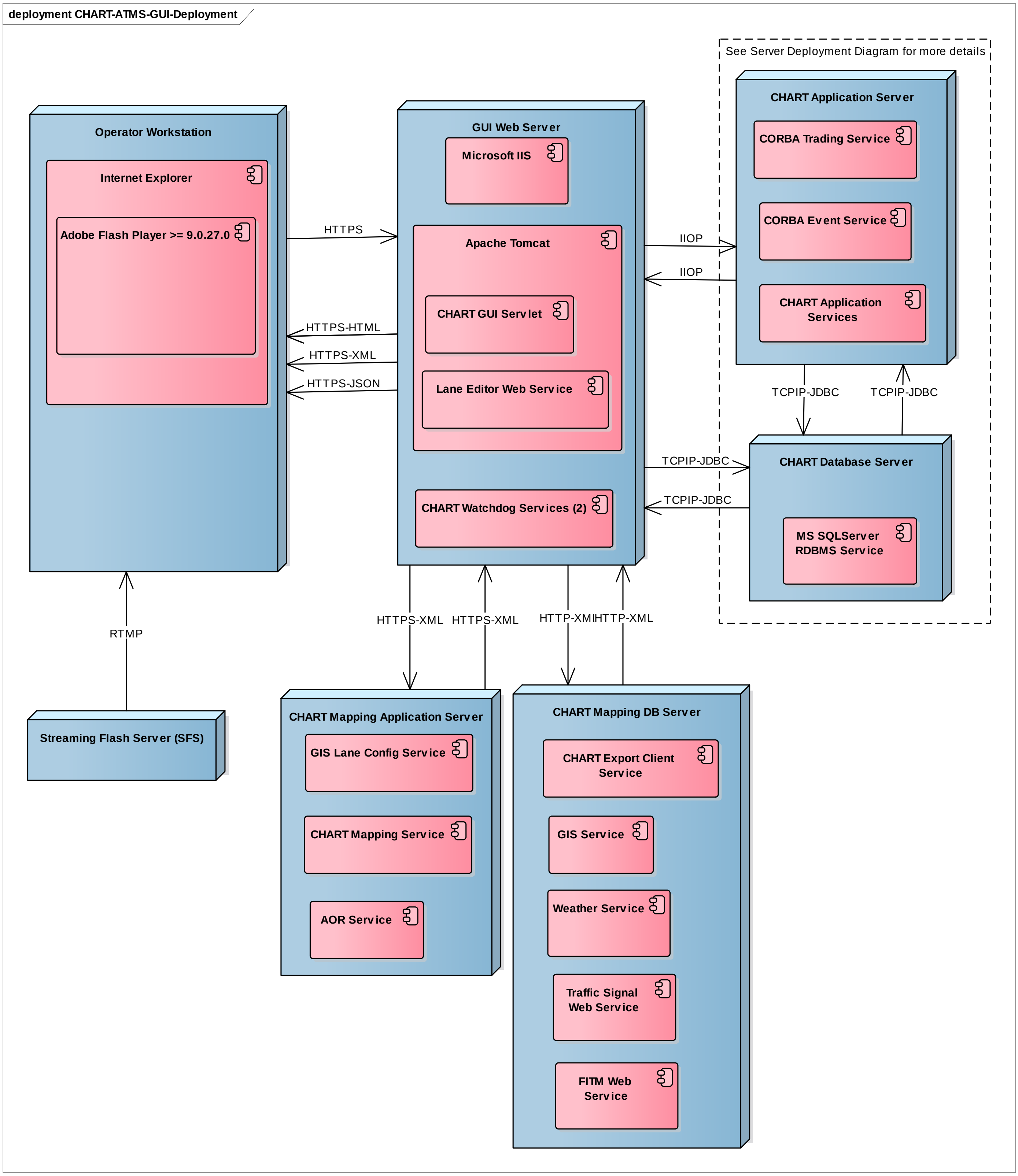


**Figure 2-2. R18.1 GUI Deployment**

### 2.2.3 Internal Interfaces

This section describes the internal interfaces added or modified in Release 18.1 of the CHART ATMS system.

N/A for Release 18.1.

## 2.3 Internal Communications Architecture

The overall communications architecture of ATMS is depicted in Figure 1-2. There are no internal communications architecture changes for ATMS R18.1.

# 3 FILE AND DATABASE DESIGN

The CHART ATMS stores most of its data in a non-spatial MS SQL Server database. Additionally, location aliases are stored in a spatial SQL Server database. Some data is stored in flat files on the CHART servers.

This section describes all of these types of data.

## 3.1 Database Management System Files

CHART ATMS Release 18.1 is tested and delivered with the fielded MS SQL Server version.

### 3.1.1 ATMS

CHART ATMS Release 18.1 is tested and delivered with the fielded MS SQL Server version.

#### 3.1.1.1 Overview

There are no database changes for Release 18.1.

#### 3.1.1.2 Database Architecture

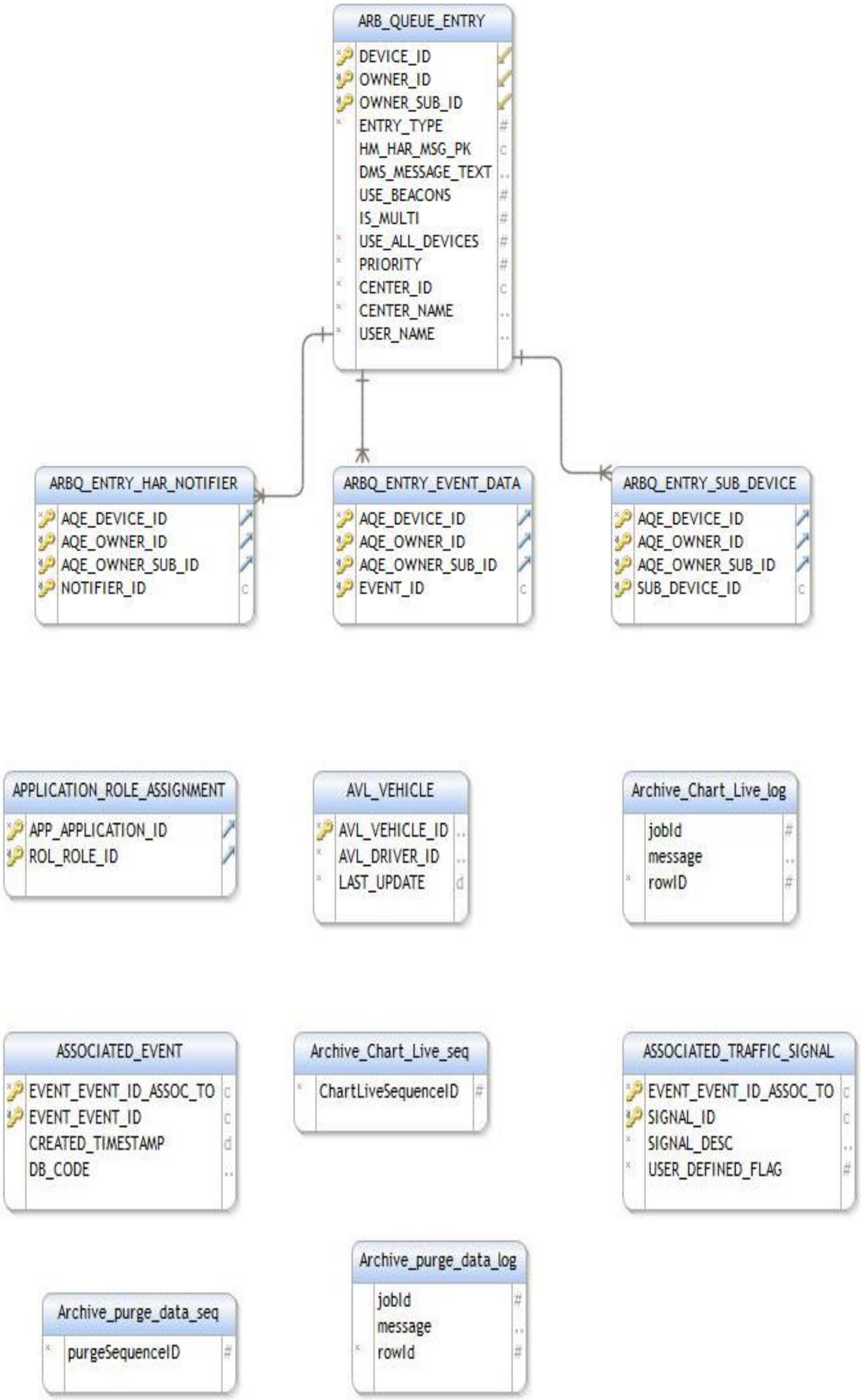
Except as noted, CHART ATMS Release 18.1 features do not impact the overall architecture of the CHART ATMS database.

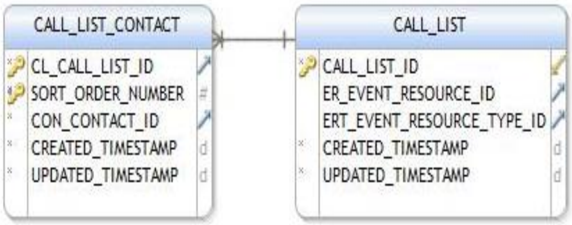
##### 3.1.1.2.1 Logical Design

Appendix A CHART Live Database Entity Relationship Diagram (ERD)

This section provides Entity Relationship Diagrams (ERDs) for the database schema used in the current release of the CHART ATMS. Figure 3-1 is a full ERD diagram for the entire database. Subsequent diagrams in this appendix are child ERDs representing the database grouped roughly in alphabetical order.

**Figure 3-1. CHART_Live ERD, Visual Table of Contents**


ARB_QUEUE_ENTRY
DEVICE_ID
OWNER_ID
OWNER_SUB_ID
ENTRY_TYPE
HM_HAR_MSG_PK
DMS_MESSAGE_TEXT
USE_BEACONS
IS_MULTI
USE_ALL_DEVICES
PRIORITY
CENTER_ID
CENTER_NAME
USER_NAME
ARBQ_ENTRY_HAR_NOTIFIER
AQE_DEVICE_ID
AQE_OWNER_ID
AQE_OWNER_SUB_ID
NOTIFIER_ID
ARBQ_ENTRY_EVENT_DATA
AQE_DEVICE_ID
AQE_OWNER_ID
AQE_OWNER_SUB_ID
EVENT_ID
ARBQ_ENTRY_SUB_DEVICE
AQE_DEVICE_ID
AQE_OWNER_ID
AQE_OWNER_SUB_ID
SUB_DEVICE_ID
APPLICATION_ROLE_ASSIGNMENT
APP_APPLICATION_ID
ROL_ROLE_ID
AVL_VEHICLE
AVL_VEHICLE_ID
AVL_DRIVER_ID
LAST_UPDATE
Archive_Chart_Live_log
jobId
message
rowID
ASSOCIATED_EVENT
EVENT_EVENT_ID_ASSOC_TO
EVENT_EVENT_ID
CREATED_TIMESTAMP
DB_CODE
Archive_Chart_Live_seq
ChartLiveSequenceID
ASSOCIATED_TRAFFIC_SIGNAL
EVENT_EVENT_ID_ASSOC_TO
SIGNAL_ID
SIGNAL_DESC
USER_DEFINED_FLAG
Archive_purge_data_log
jobId
message
rowId
Archive_purge_data_seq
purgeSequenceID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CREATED_TIMESTAMP
UPDATED_TIMESTAMP
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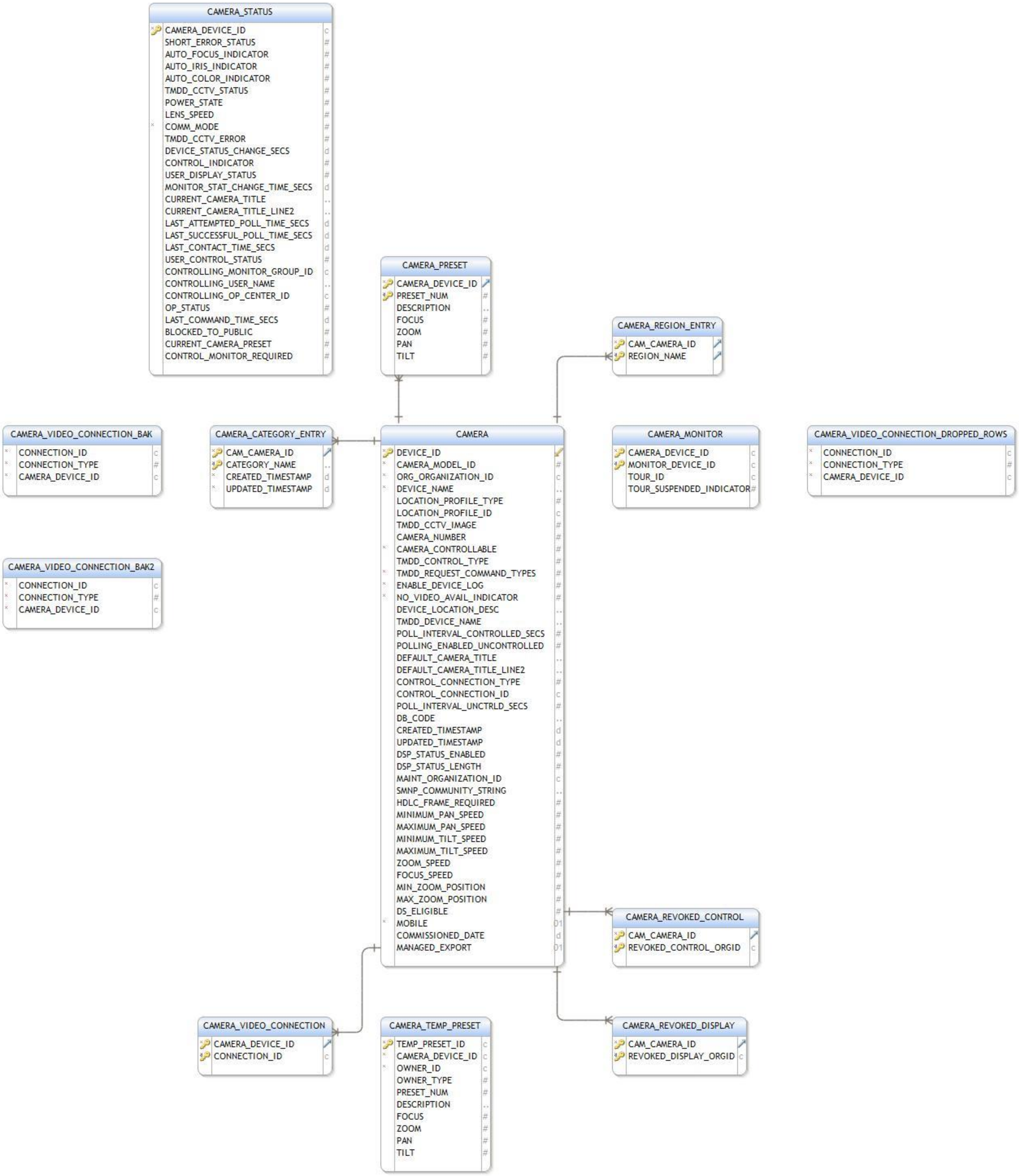
ERT_EVENT_RESOURCE_TYPE_ID
CREATED_TIMESTAMP
UPDATED_TIMESTAMP


CAMERA_STATUS
CAMERA_DEVICE_ID
SHORT_ERROR_STATUS
AUTO_FOCUS_INDICATOR
AUTO_IRIS_INDICATOR
AUTO_COLOR_INDICATOR
TMDD_CCTV_STATUS
POWER_STATE
LENS_SPEED
COMM_MODE
TMDD_CCTV_ERROR
DEVICE_STATUS_CHANGE_SECS
CONTROL_INDICATOR
USER_DISPLAY_STATUS
MONITOR_STAT_CHANGE_TIME_SECS
CURRENT_CAMERA_TITLE
CURRENT_CAMERA_TITLE_LINE2
LAST_ATTEMPTED_POLL_TIME_SECS
LAST_SUCCESSFUL_POLL_TIME_SECS
LAST_CONTACT_TIME_SECS
USER_CONTROL_STATUS
CONTROLLING_MONITOR_GROUP_ID
CONTROLLING_USER_NAME
CONTROLLING_OP_CENTER_ID
OP_STATUS
LAST_COMMAND_TIME_SECS
BLOCKED_TO_PUBLIC
CURRENT_CAMERA_PRESET
CONTROL_MONITOR_REQUIRED
CAMERA_PRESET
CAMERA_DEVICE_ID
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DESCRIPTION
FOCUS
ZOOM
PAN
TILT
CAMERA_REGION_ENTRY
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REGION_NAME
CAMERA_VIDEO_CONNECTION_BAK
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CONNECTION_TYPE
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CAMERA_CATEGORY_ENTRY
CAM_CAMERA_ID
CATEGORY_NAME
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UPDATED_TIMESTAMP
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DEVICE_ID
CAMERA_MODEL_ID
ORG_ORGANIZATION_ID
DEVICE_NAME
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LOCATION_PROFILE_ID
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TMDD_CONTROL_TYPE
TMDD_REQUEST_COMMAND_TYPES
ENABLE_DEVICE_LOG
NO_VIDEO_AVAIL_INDICATOR
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POLL_INTERVAL_CONTROLLED_SECS
POLLING_ENABLED_UNCONTROLLED
DEFAULT_CAMERA_TITLE
DEFAULT_CAMERA_TITLE_LINE2
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DSP_STATUS_LENGTH
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ZOOM_SPEED
FOCUS_SPEED
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MAX_ZOOM_POSITION
DS_ELIGIBLE
MOBILE
COMMISSIONED_DATE
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TOUR_SUSPENDED_INDICATOR
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REVOKED_CONTROL_ORGID
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TILT
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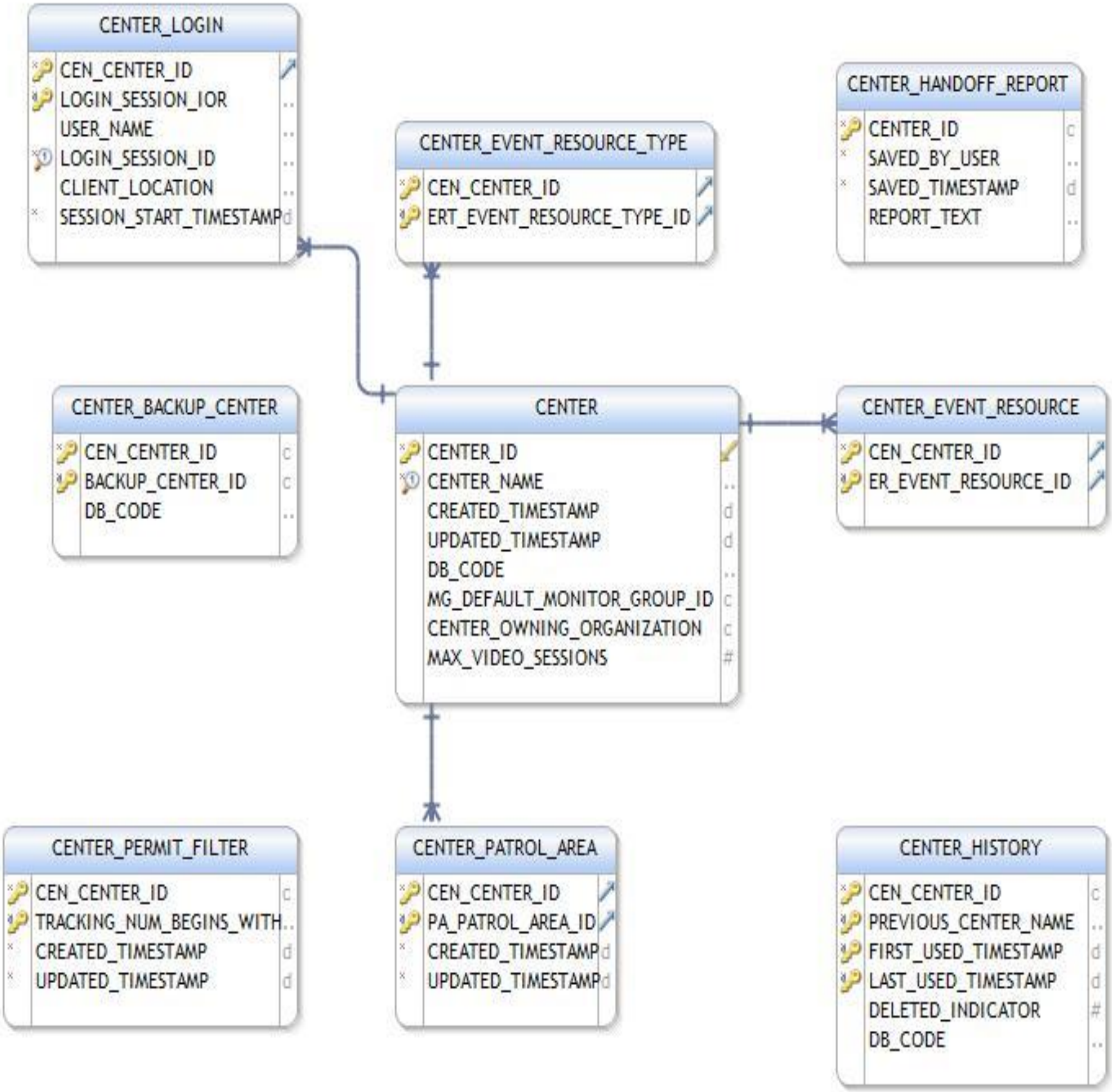
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ERT_EVENT_RESOURCE_TYPE_ID
CENTER_HANDOFF_REPORT
CENTER_ID
SAVED_BY_USER
SAVED_TIMESTAMP
REPORT_TEXT
CENTER_BACKUP_CENTER
CEN_CENTER_ID
BACKUP_CENTER_ID
DB_CODE
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CENTER_ID
CENTER_NAME
CREATED_TIMESTAMP
UPDATED_TIMESTAMP
DB_CODE
MG_DEFAULT_MONITOR_GROUP_ID
CENTER_OWNING_ORGANIZATION
MAX_VIDEO_SESSIONS
CENTER_EVENT_RESOURCE
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ER_EVENT_RESOURCE_ID
CENTER_PERMIT_FILTER
CEN_CENTER_ID
TRACKING_NUM_BEGINS_WITH
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UPDATED_TIMESTAMP
CENTER_PATROL_AREA
CEN_CENTER_ID
PA_PATROL_AREA_ID
CREATED_TIMESTAMP
UPDATED_TIMESTAMP
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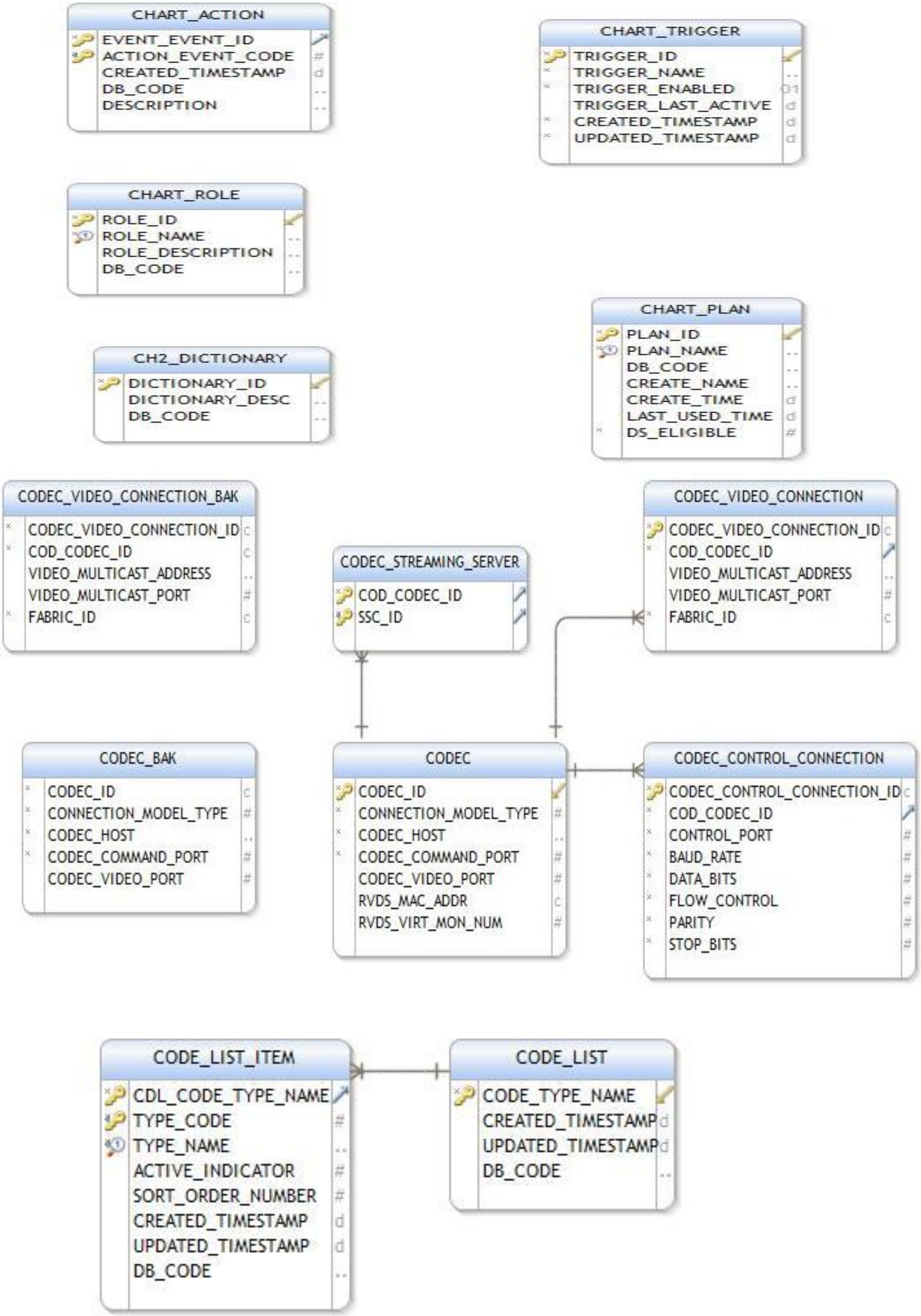
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TRIGGER_LAST_ACTIVE
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UPDATED_TIMESTAMP
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ROLE_ID
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ROLE_DESCRIPTION
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PLAN_ID
PLAN_NAME
DB_CODE
CREATE_NAME
CREATE_TIME
LAST_USED_TIME
DS_ELIGIBLE
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DICTIONARY_ID
DICTIONARY_DESC
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CODEC_VIDEO_CONNECTION_ID
COD_CODEC_ID
VIDEO_MULTICAST_ADDRESS
VIDEO_MULTICAST_PORT
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CODEC_STREAMING_SERVER
COD_CODEC_ID
SSC_ID
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CODEC_VIDEO_CONNECTION_ID
COD_CODEC_ID
VIDEO_MULTICAST_ADDRESS
VIDEO_MULTICAST_PORT
FABRIC_ID
CODEC_BAK
CODEC_ID
CONNECTION_MODEL_TYPE
CODEC_HOST
CODEC_COMMAND_PORT
CODEC_VIDEO_PORT
CODEC
CODEC_ID
CONNECTION_MODEL_TYPE
CODEC_HOST
CODEC_COMMAND_PORT
CODEC_VIDEO_PORT
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RVDS_VIRT_MON_NUM
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CODEC_CONTROL_CONNECTION_ID
COD_CODEC_ID
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BAUD_RATE
DATA_BITS
FLOW_CONTROL
PARITY
STOP_BITS
CODE_LIST_ITEM
CDL_CODE_TYPE_NAME
TYPE_CODE
TYPE_NAME
ACTIVE_INDICATOR
SORT_ORDER_NUMBER
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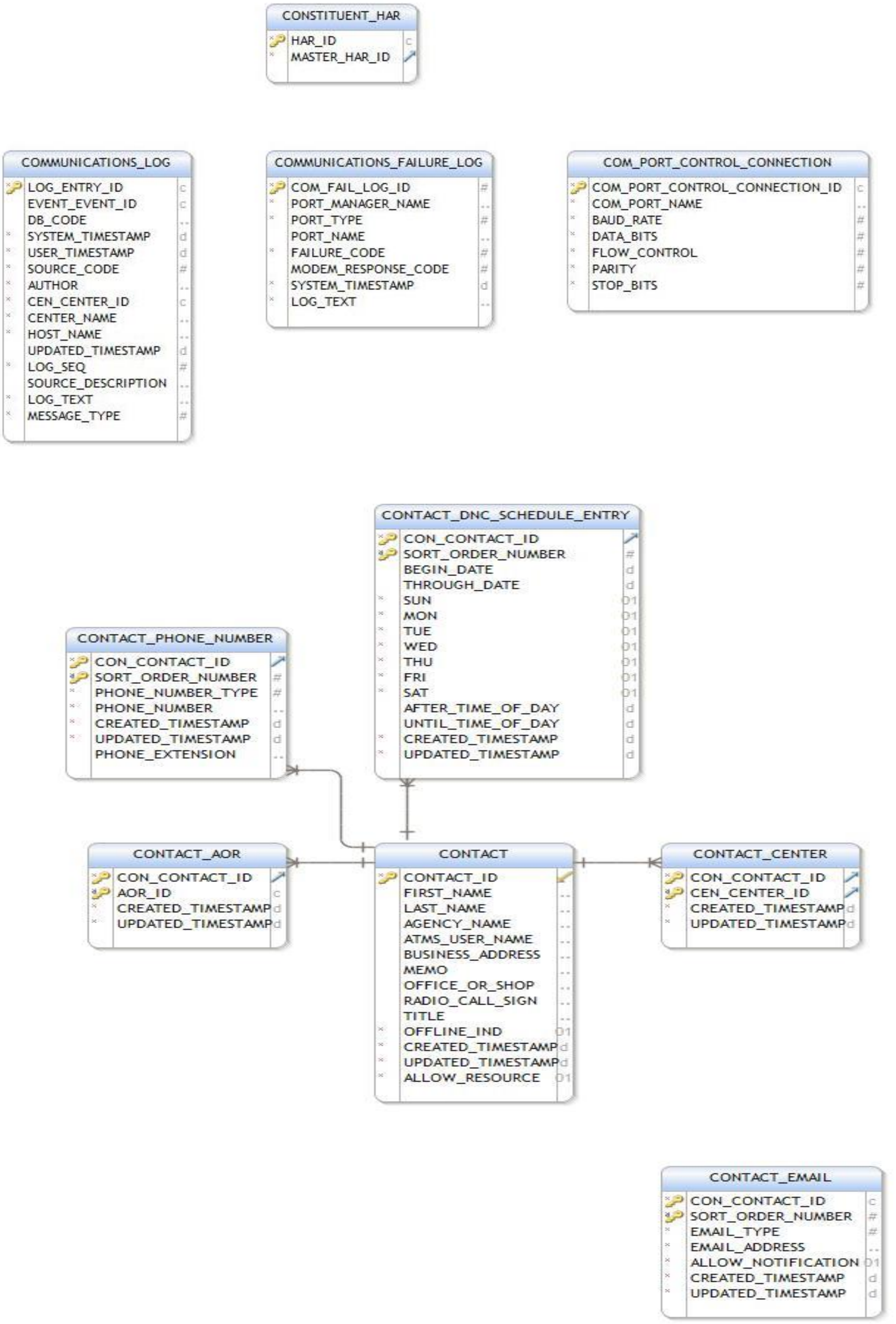
UPDATED_TIMESTAMP
DB_CODE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USER_TIMESTAMP
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CEN_CENTER_ID
CENTER_NAME
HOST_NAME
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LOG_TEXT
MESSAGE_TYPE
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COM_FAIL_LOG_ID
PORT_MANAGER_NAME
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PORT_NAME
FAILURE_CODE
MODEM_RESPONSE_CODE
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LOG_TEXT
COM_PORT_CONTROL_CONNECTION
COM_PORT_CONTROL_CONNECTION_ID
COM_PORT_NAME
BAUD_RATE
DATA_BITS
FLOW_CONTROL
PARITY
STOP_BITS
CONTACT_DNC_SCHEDULE_ENTRY
CON_CONTACT_ID
SORT_ORDER_NUMBER
BEGIN_DATE
THROUGH_DATE
SUN
MON
TUE
WED
THU
FRI
SAT
AFTER_TIME_OF_DAY
UNTIL_TIME_OF_DAY
CREATED_TIMESTAMP
UPDATED_TIMESTAMP
CONTACT_PHONE_NUMBER
CON_CONTACT_ID
SORT_ORDER_NUMBER
PHONE_NUMBER_TYPE
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UPDATED_TIMESTAMP
PHONE_EXTENSION
CONTACT_AOR
CON_CONTACT_ID
AOR_ID
CREATED_TIMESTAMP
UPDATED_TIMESTAMP
CONTACT
CONTACT_ID
FIRST_NAME
LAST_NAME
AGENCY_NAME
ATMS_USER_NAME
BUSINESS_ADDRESS
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OFFICE_OR_SHOP
RADIO_CALL_SIGN
TITLE
OFFLINE_IND
CREATED_TIMESTAMP
UPDATED_TIMESTAMP
ALLOW_RESOURCE
CONTACT_CENTER
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CEN_CENTER_ID
CREATED_TIMESTAMP
UPDATED_TIMESTAMP
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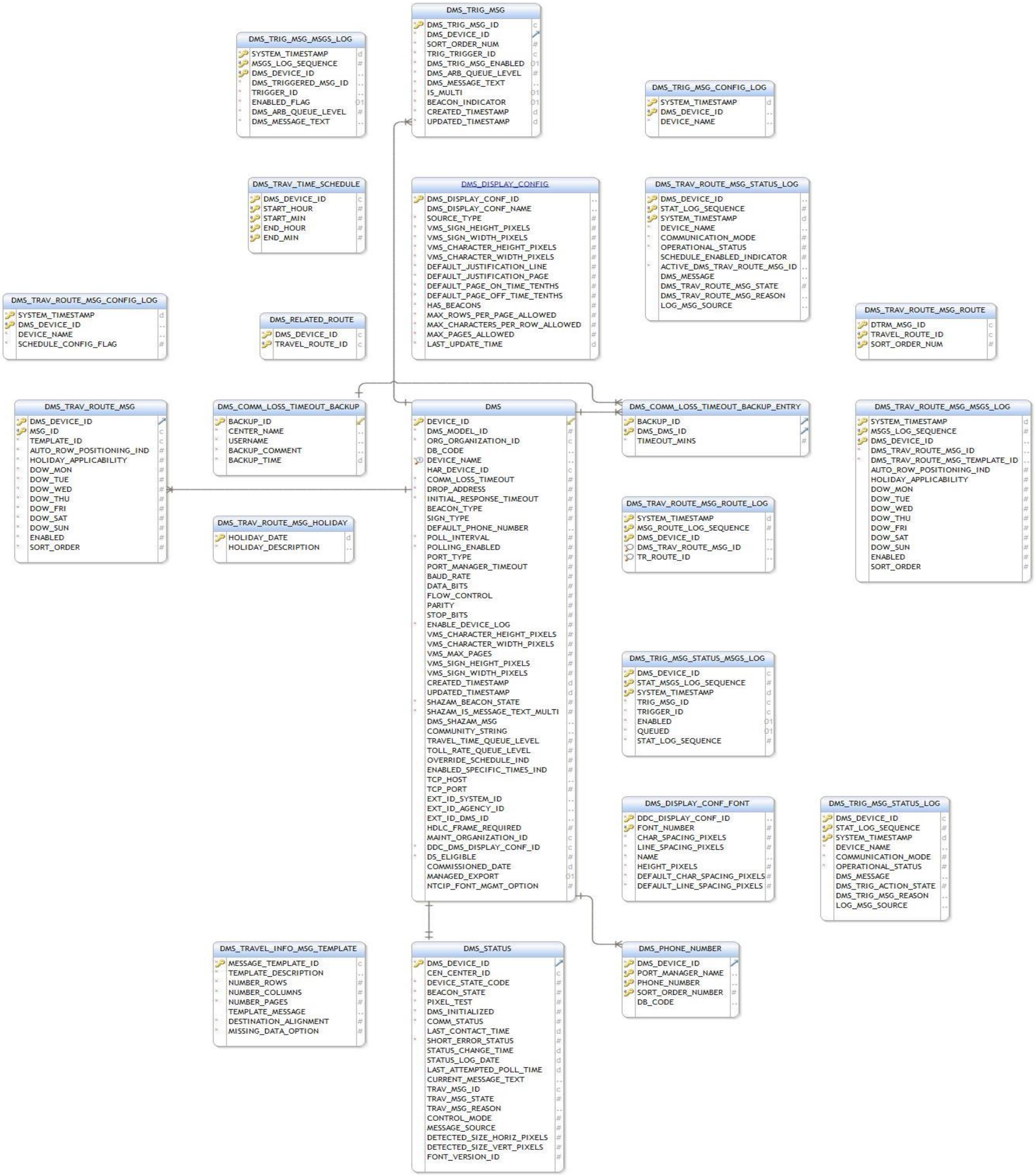
UPDATED_TIMESTAMP



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ENABLED_FLAG
DMS_ARB_QUEUE_LEVEL
DMS_MESSAGE_TEXT

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DMS_TRIG_MSG_ID
DMS_DEVICE_ID
SORT_ORDER_NUM
TRIG_TRIGGER_ID
DMS_TRIG_MSG_ENABLED
DMS_ARB_QUEUE_LEVEL
DMS_MESSAGE_TEXT
IS_MULTI
BEACON_INDICATOR
CREATED_TIMESTAMP
UPDATED_TIMESTAMP

DMS_TRIG_MSG_CONFIG_LOG
SYSTEM_TIMESTAMP
DMS_DEVICE_ID
DEVICE_NAME

DMS_TRAV_TIME_SCHEDULE
DMS_DEVICE_ID
START_HOUR
START_MIN
END_HOUR
END_MIN

DMS_DISPLAY_CONFIG
DMS_DISPLAY_CONF_ID
DMS_DISPLAY_CONF_NAME
SOURCE_TYPE
VMS_SIGN_HEIGHT_PIXELS
VMS_SIGN_WIDTH_PIXELS
VMS_CHARACTER_HEIGHT_PIXELS
VMS_CHARACTER_WIDTH_PIXELS
DEFAULT_JUSTIFICATION_LINE
DEFAULT_JUSTIFICATION_PAGE
DEFAULT_PAGE_ON_TIME_TENTHS
DEFAULT_PAGE_OFF_TIME_TENTHS
HAS_BEACONS
MAX_ROWS_PER_PAGE_ALLOWED
MAX_CHARACTERS_PER_ROW_ALLOWED
MAX_PAGES_ALLOWED
LAST_UPDATE_TIME

DMS_TRAV_ROUTE_MSG_STATUS_LOG
DMS_DEVICE_ID
STAT_LOG_SEQUENCE
SYSTEM_TIMESTAMP
DEVICE_NAME
COMMUNICATION_MODE
OPERATIONAL_STATUS
SCHEDULE_ENABLED_INDICATOR
ACTIVE_DMS_TRAV_ROUTE_MSG_ID
DMS_MESSAGE
DMS_TRAV_ROUTE_MSG_STATE
DMS_TRAV_ROUTE_MSG_REASON
LOG_MSG_SOURCE

DMS_TRAV_ROUTE_MSG_CONFIG_LOG
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DEVICE_NAME
SCHEDULE_CONFIG_FLAG

DMS_RELATED_ROUTE
DMS_DEVICE_ID
TRAVEL_ROUTE_ID

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DTRM_MSG_ID
TRAVEL_ROUTE_ID
SORT_ORDER_NUM

DMS_TRAV_ROUTE_MSG
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MSG_ID
TEMPLATE_ID
AUTO_ROW_POSITIONING_IND
HOLIDAY_APPLICABILITY
DOW_MON
DOW_TUE
DOW_WED
DOW_THU
DOW_FRI
DOW_SAT
DOW_SUN
ENABLED
SORT_ORDER

DMS_COMM_LOSS_TIMEOUT_BACKUP
BACKUP_ID
CENTER_NAME
USERNAME
BACKUP_COMMENT
BACKUP_TIME

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HOLIDAY_DATE
HOLIDAY_DESCRIPTION

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DMS_MODEL_ID
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HAR_DEVICE_ID
COMM_LOSS_TIMEOUT
DROP_ADDRESS
INITIAL_RESPONSE_TIMEOUT
BEACON_TYPE
SIGN_TYPE
DEFAULT_PHONE_NUMBER
POLL_INTERVAL
POLLING_ENABLED
PORT_TYPE
PORT_MANAGER_TIMEOUT
BAUD_RATE
DATA_BITS
FLOW_CONTROL
PARITY
STOP_BITS
ENABLE_DEVICE_LOG
VMS_CHARACTER_HEIGHT_PIXELS
VMS_CHARACTER_WIDTH_PIXELS
VMS_MAX_PAGES
VMS_SIGN_HEIGHT_PIXELS
VMS_SIGN_WIDTH_PIXELS
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UPDATED_TIMESTAMP
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SHAZAM_IS_MESSAGE_TEXT_MULTI
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TRAVEL_TIME_QUEUE_LEVEL
TOLL_RATE_QUEUE_LEVEL
OVERRIDE_SCHEDULE_IND
ENABLED_SPECIFIC_TIMES_IND
TCP_HOST
TCP_PORT
EXT_ID_SYSTEM_ID
EXT_ID_AGENCY_ID
EXT_ID_DMS_ID
HDLC_FRAME_REQUIRED
MAINT_ORGANIZATION_ID
DDC_DMS_DISPLAY_CONF_ID
DS_ELIGIBLE
COMMISSIONED_DATE
MANAGED_EXPORT
NTCIP_FONT_MGMT_OPTION

DMS_COMM_LOSS_TIMEOUT_BACKUP_ENTRY
BACKUP_ID
DMS_DMS_ID
TIMEOUT_MINS

DMS_TRAV_ROUTE_MSG_MSGS_LOG
SYSTEM_TIMESTAMP
MSGS_LOG_SEQUENCE
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DMS_TRAV_ROUTE_MSG_ID
DMS_TRAV_ROUTE_MSG_TEMPLATE_ID
AUTO_ROW_POSITIONING_IND
HOLIDAY_APPLICABILITY
DOW_MON
DOW_TUE
DOW_WED
DOW_THU
DOW_FRI
DOW_SAT
DOW_SUN
ENABLED
SORT_ORDER

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DMS_TRAV_ROUTE_MSG_ID
TR_ROUTE_ID

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ENABLED
QUEUED
STAT_LOG_SEQUENCE

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CHAR_SPACING_PIXELS
LINE_SPACING_PIXELS
NAME
HEIGHT_PIXELS
DEFAULT_CHAR_SPACING_PIXELS
DEFAULT_LINE_SPACING_PIXELS

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OPERATIONAL_STATUS
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DMS_TRIG_ACTION_STATE
DMS_TRIG_MSG_REASON
LOG_MSG_SOURCE

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NUMBER_COLUMNS
NUMBER_PAGES
TEMPLATE_MESSAGE
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MISSING_DATA_OPTION

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PIXEL_TEST
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COMM_STATUS
LAST_CONTACT_TIME
SHORT_ERROR_STATUS
STATUS_CHANGE_TIME
STATUS_LOG_DATE
LAST_ATTEMPTED_POLL_TIME
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TRAV_MSG_STATE
TRAV_MSG_REASON
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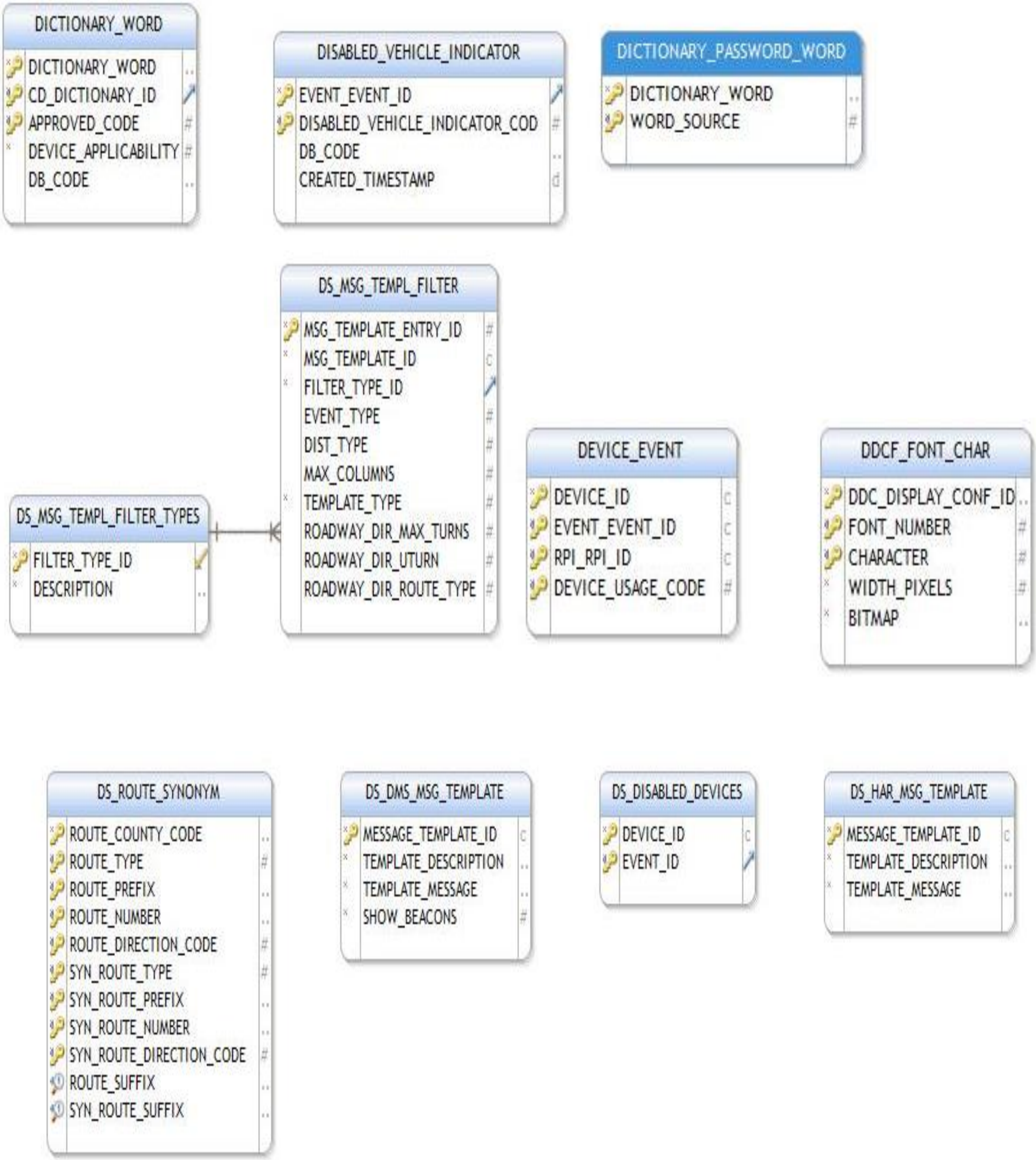

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DISABLED_VEHICLE_INDICATOR_COD
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CREATED_TIMESTAMP

DICTIONARY_PASSWORD_WORD
DICTIONARY_WORD
WORD_SOURCE

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FILTER_TYPE_ID
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MAX_COLUMNS
TEMPLATE_TYPE
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ROADWAY_DIR_UTURN
ROADWAY_DIR_ROUTE_TYPE

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DESCRIPTION

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WIDTH_PIXELS
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SYN_ROUTE_NUMBER
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SYN_ROUTE_SUFFIX

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TEMPLATE_MESSAGE
SHOW_BEACONS

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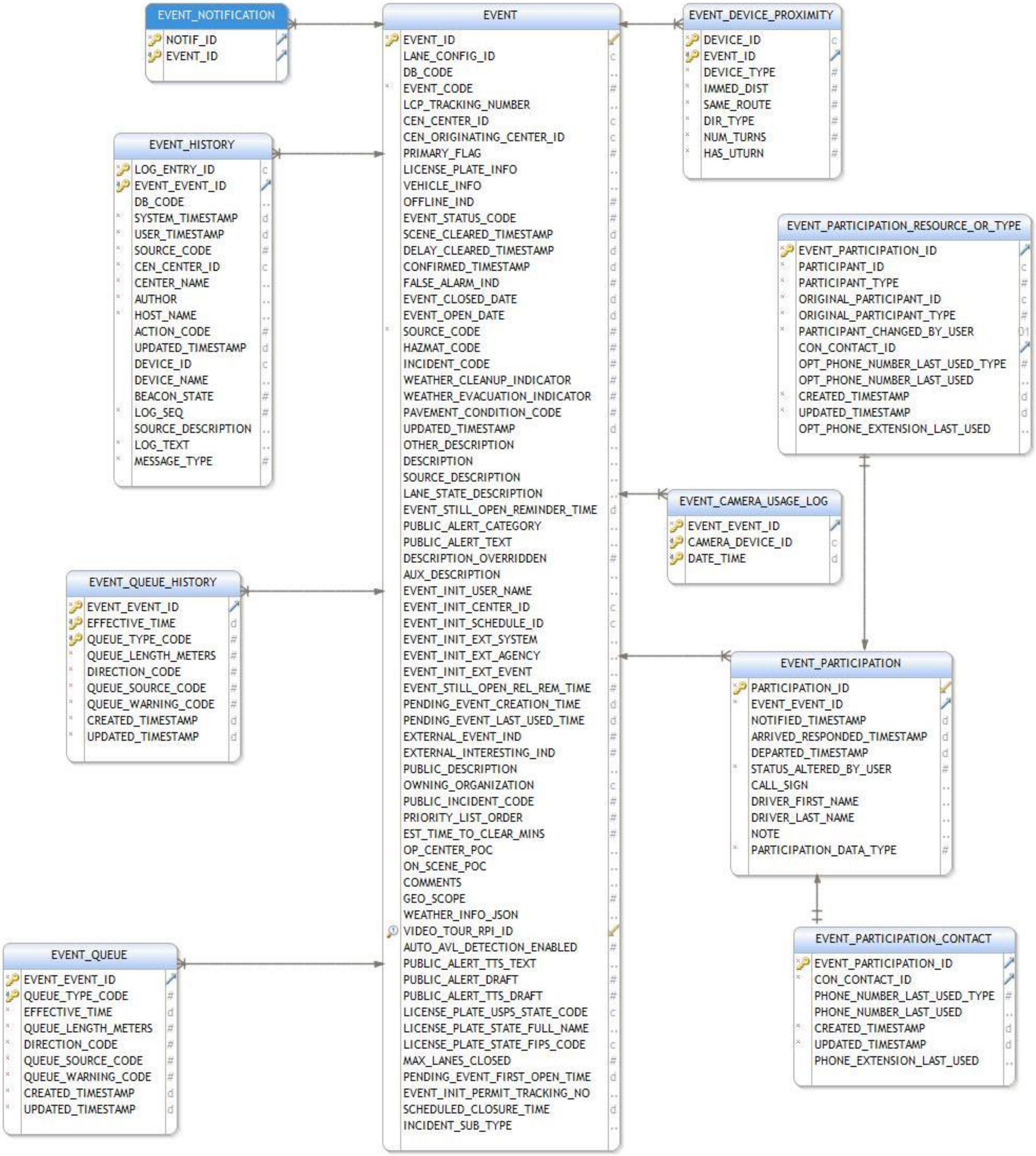
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VEHICLE_INFO
OFFLINE_IND
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EVENT_OPEN_DATE
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WEATHER_EVACUATION_INDICATOR
PAVEMENT_CONDITION_CODE
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SOURCE_DESCRIPTION
LANE_STATE_DESCRIPTION
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AUX_DESCRIPTION
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EVENT_INIT_SCHEDULE_ID
EVENT_INIT_EXT_SYSTEM
EVENT_INIT_EXT_AGENCY
EVENT_INIT_EXT_EVENT
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PENDING_EVENT_LAST_USED_TIME
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EXTERNAL_INTERESTING_IND
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ON_SCENE_POC
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GEO_SCOPE
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PUBLIC_ALERT_DRAFT
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LICENSE_PLATE_STATE_FIPS_CODE
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SCHEDULED_CLOSURE_TIME
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DEVICE_TYPE
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SAME_ROUTE
DIR_TYPE
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HAS_UTURN
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AUTHOR
HOST_NAME
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PARTICIPANT_TYPE
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OPT_PHONE_NUMBER_LAST_USED
CREATED_TIMESTAMP
UPDATED_TIMESTAMP
OPT_PHONE_EXTENSION_LAST_USED
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CAMERA_DEVICE_ID
DATE_TIME
EVENT_QUEUE_HISTORY
EVENT_EVENT_ID
EFFECTIVE_TIME
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QUEUE_LENGTH_METERS
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QUEUE_WARNING_CODE
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UPDATED_TIMESTAMP
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DEPARTED_TIMESTAMP
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DRIVER_LAST_NAME
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QUEUE_LENGTH_METERS
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QUEUE_SOURCE_CODE
QUEUE_WARNING_CODE
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UPDATED_TIMESTAMP
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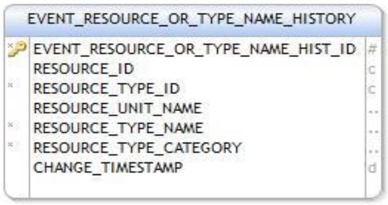

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| * | RESOURCE_TYPE_ID | c |
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| * | RESOURCE_TYPE_NAME | .. |
| * | RESOURCE_TYPE_CATEGORY | .. |
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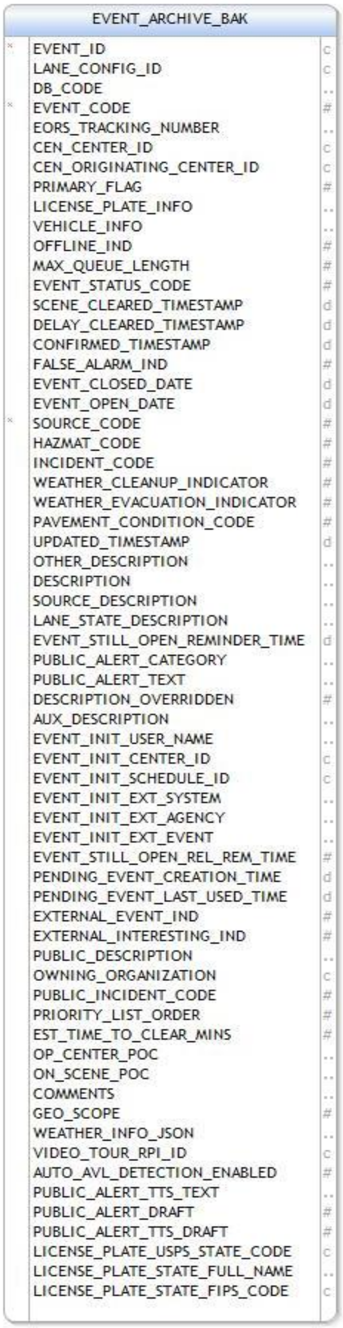

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| | CEN_ORIGINATING_CENTER_ID | c |
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| | LICENSE_PLATE_INFO | .. |
| | VEHICLE_INFO | .. |
| | OFFLINE_IND | # |
| | MAX_QUEUE_LENGTH | # |
| | EVENT_STATUS_CODE | # |
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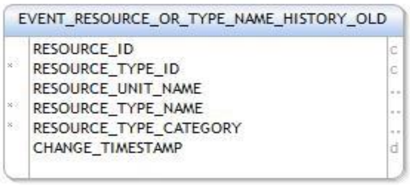
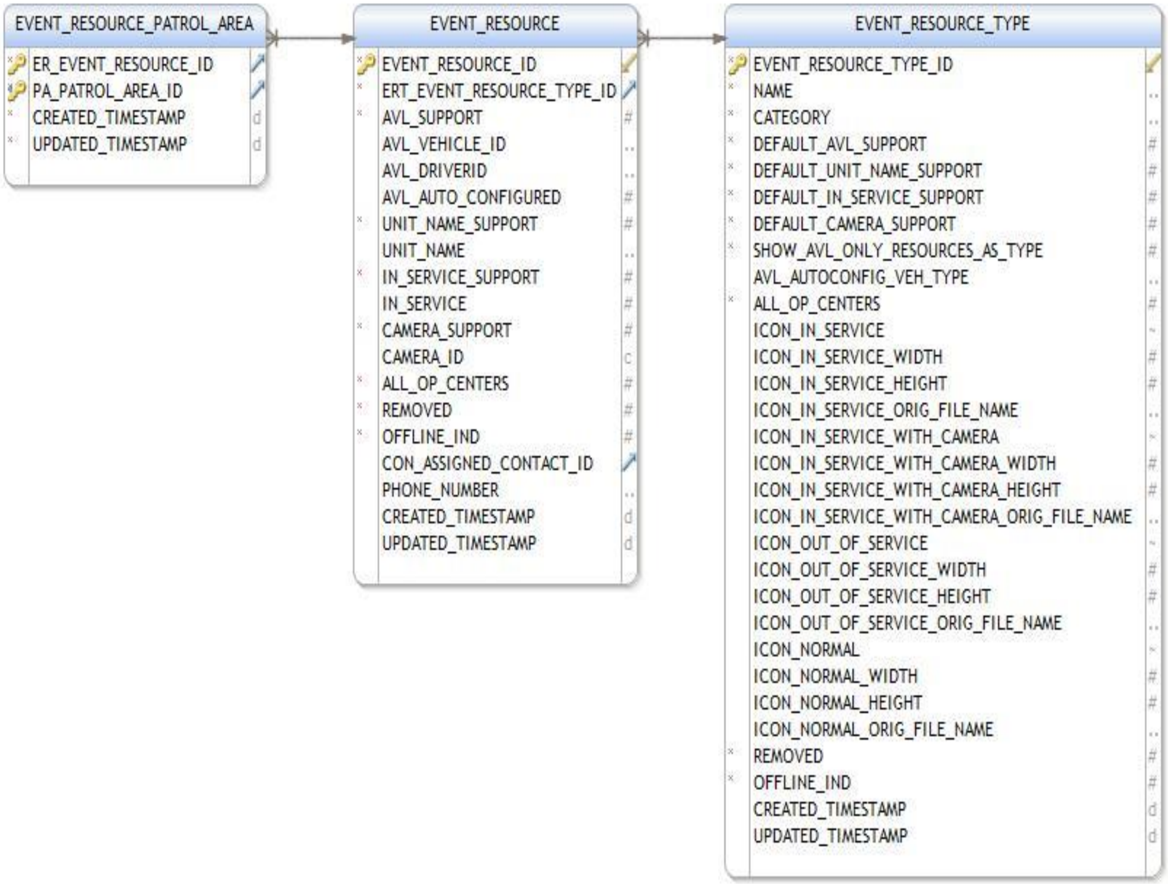
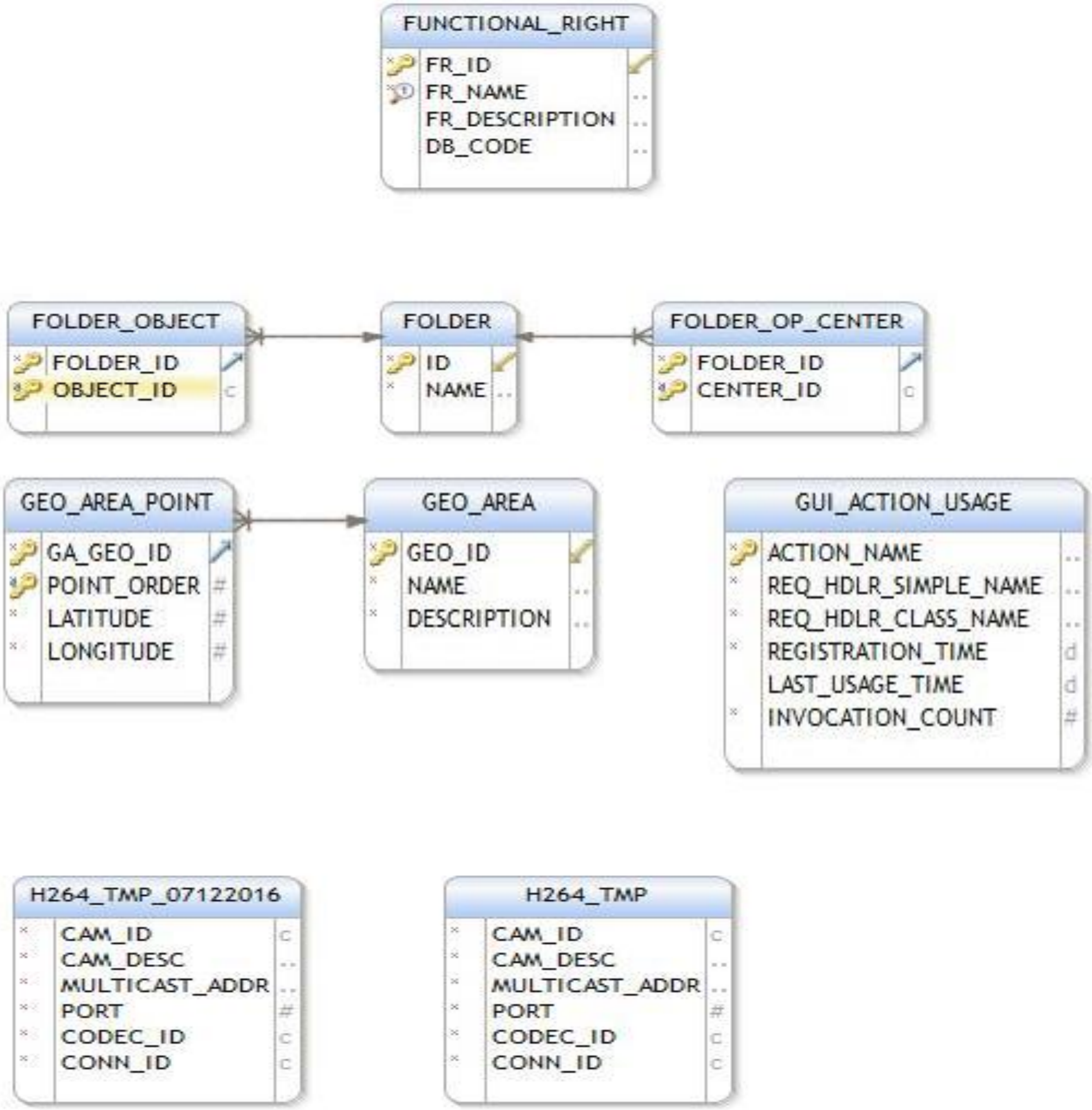
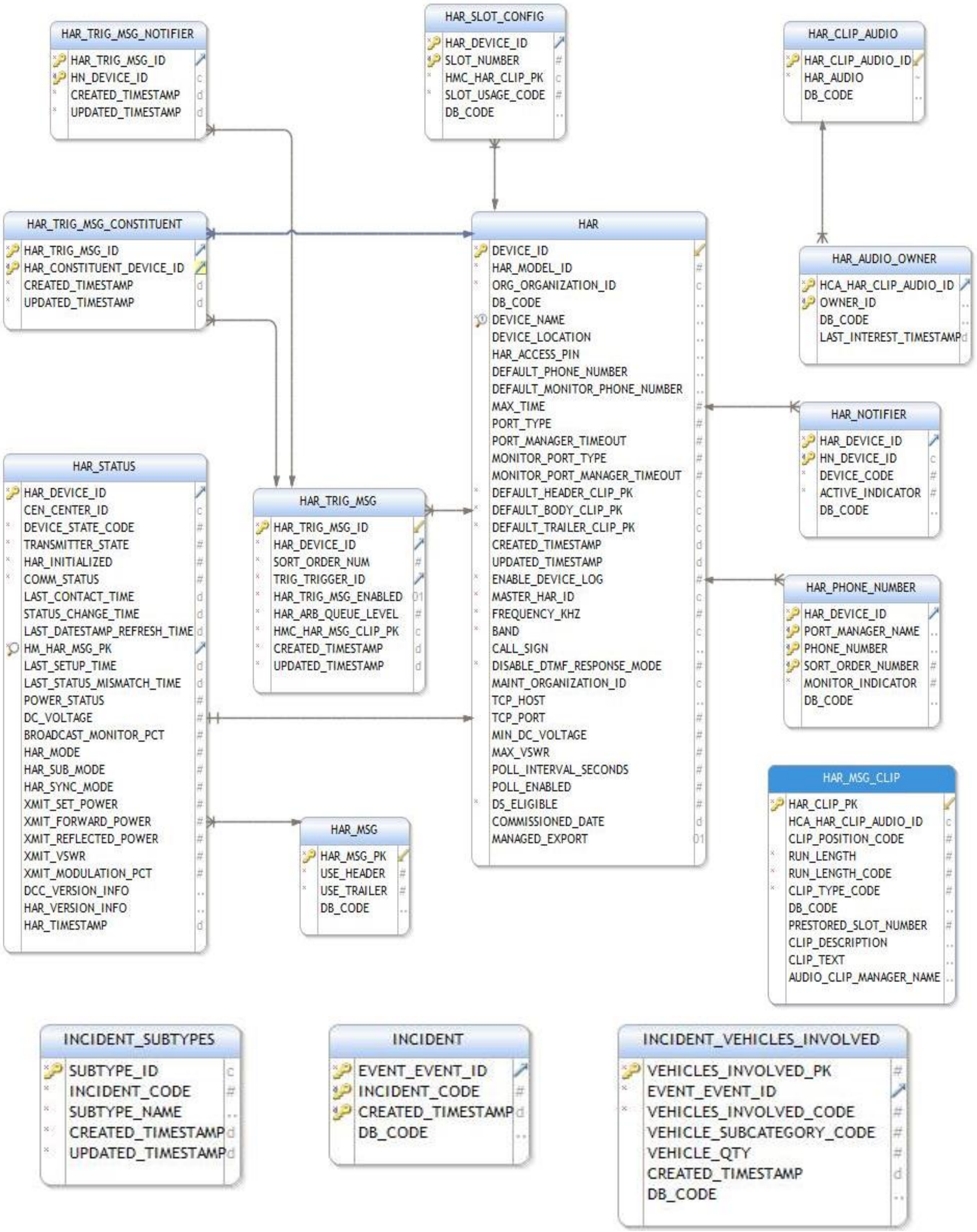
| | DELAY_CLEARED_TIMESTAMP | d |
| | CONFIRMED_TIMESTAMP | d |
| | FALSE_ALARM_IND | # |
| | EVENT_CLOSED_DATE | d |
| | EVENT_OPEN_DATE | d |
| * | SOURCE_CODE | # |
| | HAZMAT_CODE | # |
| | INCIDENT_CODE | # |
| | WEATHER_CLEANUP_INDICATOR | # |
| | WEATHER_EVACUATION_INDICATOR | # |
| | PAVEMENT_CONDITION_CODE | # |
| | UPDATED_TIMESTAMP | d |
| | OTHER_DESCRIPTION | .. |
| | DESCRIPTION | .. |
| | SOURCE_DESCRIPTION | .. |
| | LANE_STATE_DESCRIPTION | .. |
| | EVENT_STILL_OPEN_REMINDER_TIME | d |
| | PUBLIC_ALERT_CATEGORY | .. |
| | PUBLIC_ALERT_TEXT | .. |
| | DESCRIPTION_OVERRIDDEN | # |
| | AUX_DESCRIPTION | .. |
| | EVENT_INIT_USER_NAME | .. |
| | EVENT_INIT_CENTER_ID | c |
| | EVENT_INIT_SCHEDULE_ID | c |
| | EVENT_INIT_EXT_SYSTEM | .. |
| | EVENT_INIT_EXT_AGENCY | .. |
| | EVENT_INIT_EXT_EVENT | .. |
| | EVENT_STILL_OPEN_REL_REM_TIME | # |
| | PENDING_EVENT_CREATION_TIME | d |
| | PENDING_EVENT_LAST_USED_TIME | d |
| | EXTERNAL_EVENT_IND | # |
| | EXTERNAL_INTERESTING_IND | # |
| | PUBLIC_DESCRIPTION | .. |
| | OWNING_ORGANIZATION | c |
| | PUBLIC_INCIDENT_CODE | # |
| | PRIORITY_LIST_ORDER | # |
| | EST_TIME_TO_CLEAR_MINS | # |
| | OP_CENTER_POC | .. |
| | ON_SCENE_POC | .. |
| | COMMENTS | .. |
| | GEO_SCOPE | # |
| | WEATHER_INFO_JSON | .. |
| | VIDEO_TOUR_RPI_ID | c |
| | AUTO_AVL_DETECTION_ENABLED | # |
| | PUBLIC_ALERT_TTS_TEXT | .. |
| | PUBLIC_ALERT_DRAFT | # |
| | PUBLIC_ALERT_TTS_DRAFT | # |
| | LICENSE_PLATE_USPS_STATE_CODE | c |
| | LICENSE_PLATE_STATE_FULL_NAME | .. |
| | LICENSE_PLATE_STATE_FIPS_CODE | c |

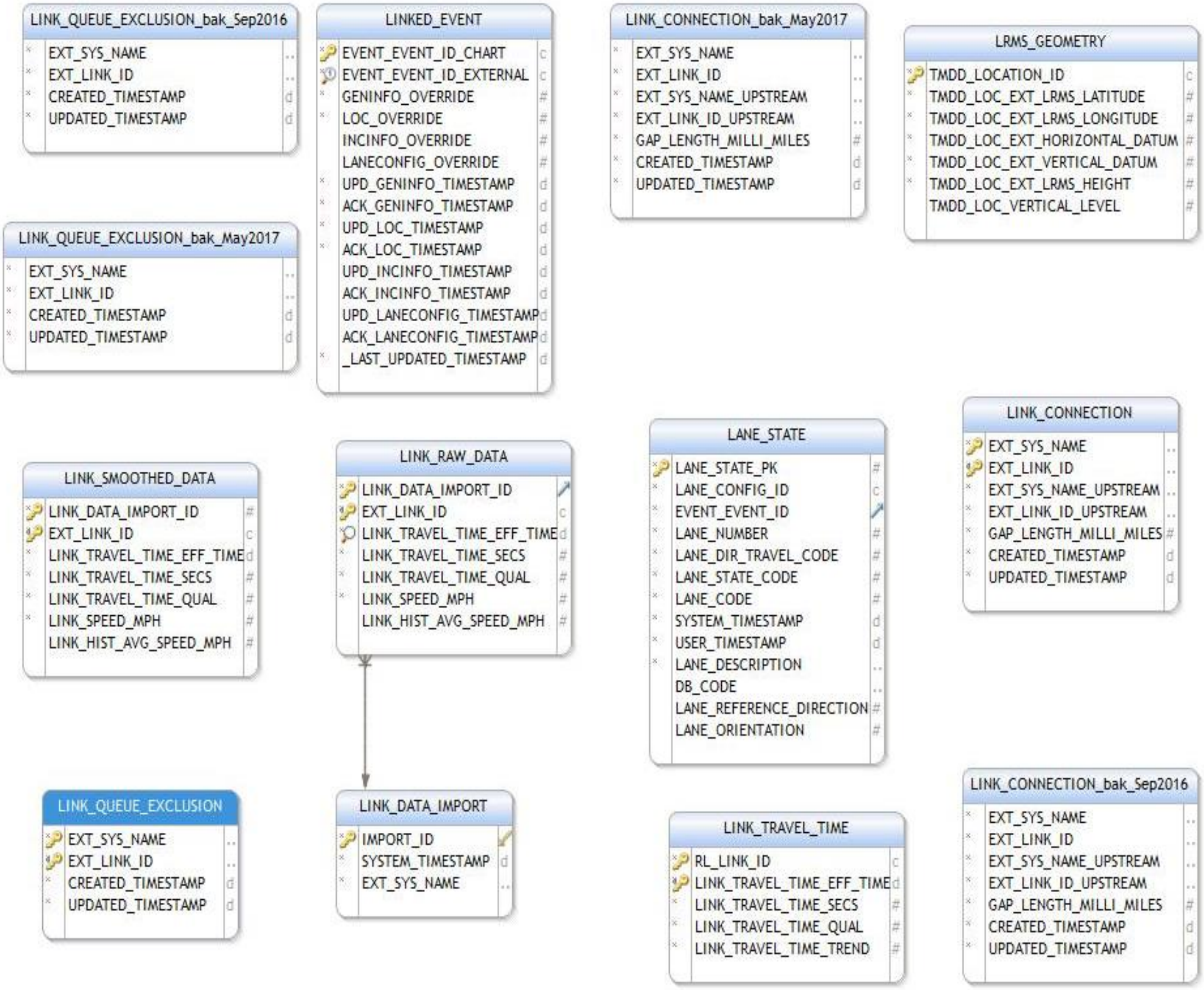


| | EVENT_RESOURCE_OR_TYPE_NAME_HISTORY_OLD | |
|---|---|---|
| | RESOURCE_ID | c |
| * | RESOURCE_TYPE_ID | c |
| | RESOURCE_UNIT_NAME | .. |
| * | RESOURCE_TYPE_NAME | .. |
| * | RESOURCE_TYPE_CATEGORY | .. |
| | CHANGE_TIMESTAMP | d |


EVENT_RESOURCE_PATROL_AREA
ER_EVENT_RESOURCE_ID
PA_PATROL_AREA_ID
CREATED_TIMESTAMP
UPDATED_TIMESTAMP
EVENT_RESOURCE
EVENT_RESOURCE_ID
ERT_EVENT_RESOURCE_TYPE_ID
AVL_SUPPORT
AVL_VEHICLE_ID
AVL_DRIVERID
AVL_AUTO_CONFIGURED
UNIT_NAME_SUPPORT
UNIT_NAME
IN_SERVICE_SUPPORT
IN_SERVICE
CAMERA_SUPPORT
CAMERA_ID
ALL_OP_CENTERS
REMOVED
OFFLINE_IND
CON_ASSIGNED_CONTACT_ID
PHONE_NUMBER
CREATED_TIMESTAMP
UPDATED_TIMESTAMP
EVENT_RESOURCE_TYPE
EVENT_RESOURCE_TYPE_ID
NAME
CATEGORY
DEFAULT_AVL_SUPPORT
DEFAULT_UNIT_NAME_SUPPORT
DEFAULT_IN_SERVICE_SUPPORT
DEFAULT_CAMERA_SUPPORT
SHOW_AVL_ONLY_RESOURCES_AS_TYPE
AVL_AUTOCONFIG_VEH_TYPE
ALL_OP_CENTERS
ICON_IN_SERVICE
ICON_IN_SERVICE_WIDTH
ICON_IN_SERVICE_HEIGHT
ICON_IN_SERVICE_ORIG_FILE_NAME
ICON_IN_SERVICE_WITH_CAMERA
ICON_IN_SERVICE_WITH_CAMERA_WIDTH
ICON_IN_SERVICE_WITH_CAMERA_HEIGHT
ICON_IN_SERVICE_WITH_CAMERA_ORIG_FILE_NAME
ICON_OUT_OF_SERVICE
ICON_OUT_OF_SERVICE_WIDTH
ICON_OUT_OF_SERVICE_HEIGHT
ICON_OUT_OF_SERVICE_ORIG_FILE_NAME
ICON_NORMAL
ICON_NORMAL_WIDTH
ICON_NORMAL_HEIGHT
ICON_NORMAL_ORIG_FILE_NAME
REMOVED
OFFLINE_IND
CREATED_TIMESTAMP
UPDATED_TIMESTAMP


FUNCTIONAL_RIGHT
FR_ID
FR_NAME
FR_DESCRIPTION
DB_CODE
FOLDER_OBJECT
FOLDER_ID
OBJECT_ID
FOLDER
ID
NAME
FOLDER_OP_CENTER
FOLDER_ID
CENTER_ID
GEO_AREA_POINT
GA_GEO_ID
POINT_ORDER
LATITUDE
LONGITUDE
GEO_AREA
GEO_ID
NAME
DESCRIPTION
GUI_ACTION_USAGE
ACTION_NAME
REQ_HDLR_SIMPLE_NAME
REQ_HDLR_CLASS_NAME
REGISTRATION_TIME
LAST_USAGE_TIME
INVOCATION_COUNT
H264_TMP_07122016
CAM_ID
CAM_DESC
MULTICAST_ADDR
PORT
CODEC_ID
CONN_ID
H264_TMP
CAM_ID
CAM_DESC
MULTICAST_ADDR
PORT
CODEC_ID
CONN_ID


HAR_TRIG_MSG_NOTIFIER
HAR_TRIG_MSG_ID
HN_DEVICE_ID
CREATED_TIMESTAMP
UPDATED_TIMESTAMP
HAR_SLOT_CONFIG
HAR_DEVICE_ID
SLOT_NUMBER
HMC_HAR_CLIP_PK
SLOT_USAGE_CODE
DB_CODE
HAR_CLIP_AUDIO
HAR_CLIP_AUDIO_ID
HAR_AUDIO
DB_CODE
HAR_TRIG_MSG_CONSTITUENT
HAR_TRIG_MSG_ID
HAR_CONSTITUENT_DEVICE_ID
CREATED_TIMESTAMP
UPDATED_TIMESTAMP
HAR
DEVICE_ID
HAR_MODEL_ID
ORG_ORGANIZATION_ID
DB_CODE
DEVICE_NAME
DEVICE_LOCATION
HAR_ACCESS_PIN
DEFAULT_PHONE_NUMBER
DEFAULT_MONITOR_PHONE_NUMBER
MAX_TIME
PORT_TYPE
PORT_MANAGER_TIMEOUT
MONITOR_PORT_TYPE
MONITOR_PORT_MANAGER_TIMEOUT
DEFAULT_HEADER_CLIP_PK
DEFAULT_BODY_CLIP_PK
DEFAULT_TRAILER_CLIP_PK
CREATED_TIMESTAMP
UPDATED_TIMESTAMP
ENABLE_DEVICE_LOG
MASTER_HAR_ID
FREQUENCY_KHZ
BAND
CALL_SIGN
DISABLE_DTMF_RESPONSE_MODE
MAINT_ORGANIZATION_ID
TCP_HOST
TCP_PORT
MIN_DC_VOLTAGE
MAX_VSWR
POLL_INTERVAL_SECONDS
POLL_ENABLED
DS_ELIGIBLE
COMMISSIONED_DATE
MANAGED_EXPORT
HAR_AUDIO_OWNER
HCA_HAR_CLIP_AUDIO_ID
OWNER_ID
DB_CODE
LAST_INTEREST_TIMESTAMP
HAR_NOTIFIER
HAR_DEVICE_ID
HN_DEVICE_ID
DEVICE_CODE
ACTIVE_INDICATOR
DB_CODE
HAR_STATUS
HAR_DEVICE_ID
CEN_CENTER_ID
DEVICE_STATE_CODE
TRANSMITTER_STATE
HAR_INITIALIZED
COMM_STATUS
LAST_CONTACT_TIME
STATUS_CHANGE_TIME
LAST_DATESTAMP_REFRESH_TIME
HM_HAR_MSG_PK
LAST_SETUP_TIME
LAST_STATUS_MISMATCH_TIME
POWER_STATUS
DC_VOLTAGE
BROADCAST_MONITOR_PCT
HAR_MODE
HAR_SUB_MODE
HAR_SYNC_MODE
XMIT_SET_POWER
XMIT_FORWARD_POWER
XMIT_REFLECTED_POWER
XMIT_VSWR
XMIT_MODULATION_PCT
DCC_VERSION_INFO
HAR_VERSION_INFO
HAR_TIMESTAMP
HAR_TRIG_MSG
HAR_TRIG_MSG_ID
HAR_DEVICE_ID
SORT_ORDER_NUM
TRIG_TRIGGER_ID
HAR_TRIG_MSG_ENABLED
HAR_ARB_QUEUE_LEVEL
HMC_HAR_MSG_CLIP_PK
CREATED_TIMESTAMP
UPDATED_TIMESTAMP
HAR_PHONE_NUMBER
HAR_DEVICE_ID
PORT_MANAGER_NAME
PHONE_NUMBER
SORT_ORDER_NUMBER
MONITOR_INDICATOR
DB_CODE
HAR_MSG
HAR_MSG_PK
USE_HEADER
USE_TRAILER
DB_CODE
HAR_MSG_CLIP
HAR_CLIP_PK
HCA_HAR_CLIP_AUDIO_ID
CLIP_POSITION_CODE
RUN_LENGTH
RUN_LENGTH_CODE
CLIP_TYPE_CODE
DB_CODE
PRESTORED_SLOT_NUMBER
CLIP_DESCRIPTION
CLIP_TEXT
AUDIO_CLIP_MANAGER_NAME
INCIDENT_SUBTYPES
SUBTYPE_ID
INCIDENT_CODE
SUBTYPE_NAME
CREATED_TIMESTAMP
UPDATED_TIMESTAMP
INCIDENT
EVENT_EVENT_ID
INCIDENT_CODE
CREATED_TIMESTAMP
DB_CODE
INCIDENT_VEHICLES_INVOLVED
VEHICLES_INVOLVED_PK
EVENT_EVENT_ID
VEHICLES_INVOLVED_CODE
VEHICLE_SUBCATEGORY_CODE
VEHICLE_QTY
CREATED_TIMESTAMP
DB_CODE



| LINK_QUEUE_EXCLUSION_bak_Sep2016 | |
|---|---|
| EXT_SYS_NAME | .. |
| EXT_LINK_ID | .. |
| CREATED_TIMESTAMP | d |
| UPDATED_TIMESTAMP | d |

| LINKED_EVENT | |
|---|---|
| EVENT_EVENT_ID_CHART | c |
| EVENT_EVENT_ID_EXTERNAL | c |
| GENINFO_OVERRIDE | # |
| LOC_OVERRIDE | # |
| INCINFO_OVERRIDE | # |
| LANECONFIG_OVERRIDE | # |
| UPD_GENINFO_TIMESTAMP | d |
| ACK_GENINFO_TIMESTAMP | d |
| UPD_LOC_TIMESTAMP | d |
| ACK_LOC_TIMESTAMP | d |
| UPD_INCINFO_TIMESTAMP | d |
| ACK_INCINFO_TIMESTAMP | d |
| UPD_LANECONFIG_TIMESTAMP | d |
| ACK_LANECONFIG_TIMESTAMP | d |
| _LAST_UPDATED_TIMESTAMP | d |

| LINK_CONNECTION_bak_May2017 | |
|---|---|
| EXT_SYS_NAME | .. |
| EXT_LINK_ID | .. |
| EXT_SYS_NAME_UPSTREAM | .. |
| EXT_LINK_ID_UPSTREAM | .. |
| GAP_LENGTH_MILLI_MILES | # |
| CREATED_TIMESTAMP | d |
| UPDATED_TIMESTAMP | d |

| LRMS_GEOMETRY | |
|---|---|
| TMDD_LOCATION_ID | c |
| TMDD_LOC_EXT_LRMS_LATITUDE | # |
| TMDD_LOC_EXT_LRMS_LONGITUDE | # |
| TMDD_LOC_EXT_HORIZONTAL_DATUM | # |
| TMDD_LOC_EXT_VERTICAL_DATUM | # |
| TMDD_LOC_EXT_LRMS_HEIGHT | # |
| TMDD_LOC_VERTICAL_LEVEL | # |

| LINK_QUEUE_EXCLUSION_bak_May2017 | |
|---|---|
| EXT_SYS_NAME | .. |
| EXT_LINK_ID | .. |
| CREATED_TIMESTAMP | d |
| UPDATED_TIMESTAMP | d |

| LINK_SMOOTHED_DATA | |
|---|---|
| LINK_DATA_IMPORT_ID | # |
| EXT_LINK_ID | c |
| LINK_TRAVEL_TIME_EFF_TIME | d |
| LINK_TRAVEL_TIME_SECS | # |
| LINK_TRAVEL_TIME_QUAL | # |
| LINK_SPEED_MPH | # |
| LINK_HIST_AVG_SPEED_MPH | # |

| LINK_RAW_DATA | |
|---|---|
| LINK_DATA_IMPORT_ID | |
| EXT_LINK_ID | c |
| LINK_TRAVEL_TIME_EFF_TIME | d |
| LINK_TRAVEL_TIME_SECS | # |
| LINK_TRAVEL_TIME_QUAL | # |
| LINK_SPEED_MPH | # |
| LINK_HIST_AVG_SPEED_MPH | # |

| LANE_STATE | |
|---|---|
| LANE_STATE_PK | # |
| LANE_CONFIG_ID | c |
| EVENT_EVENT_ID | |
| LANE_NUMBER | # |
| LANE_DIR_TRAVEL_CODE | # |
| LANE_STATE_CODE | # |
| LANE_CODE | # |
| SYSTEM_TIMESTAMP | d |
| USER_TIMESTAMP | d |
| LANE_DESCRIPTION | .. |
| DB_CODE | .. |
| LANE_REFERENCE_DIRECTION | # |
| LANE_ORIENTATION | # |

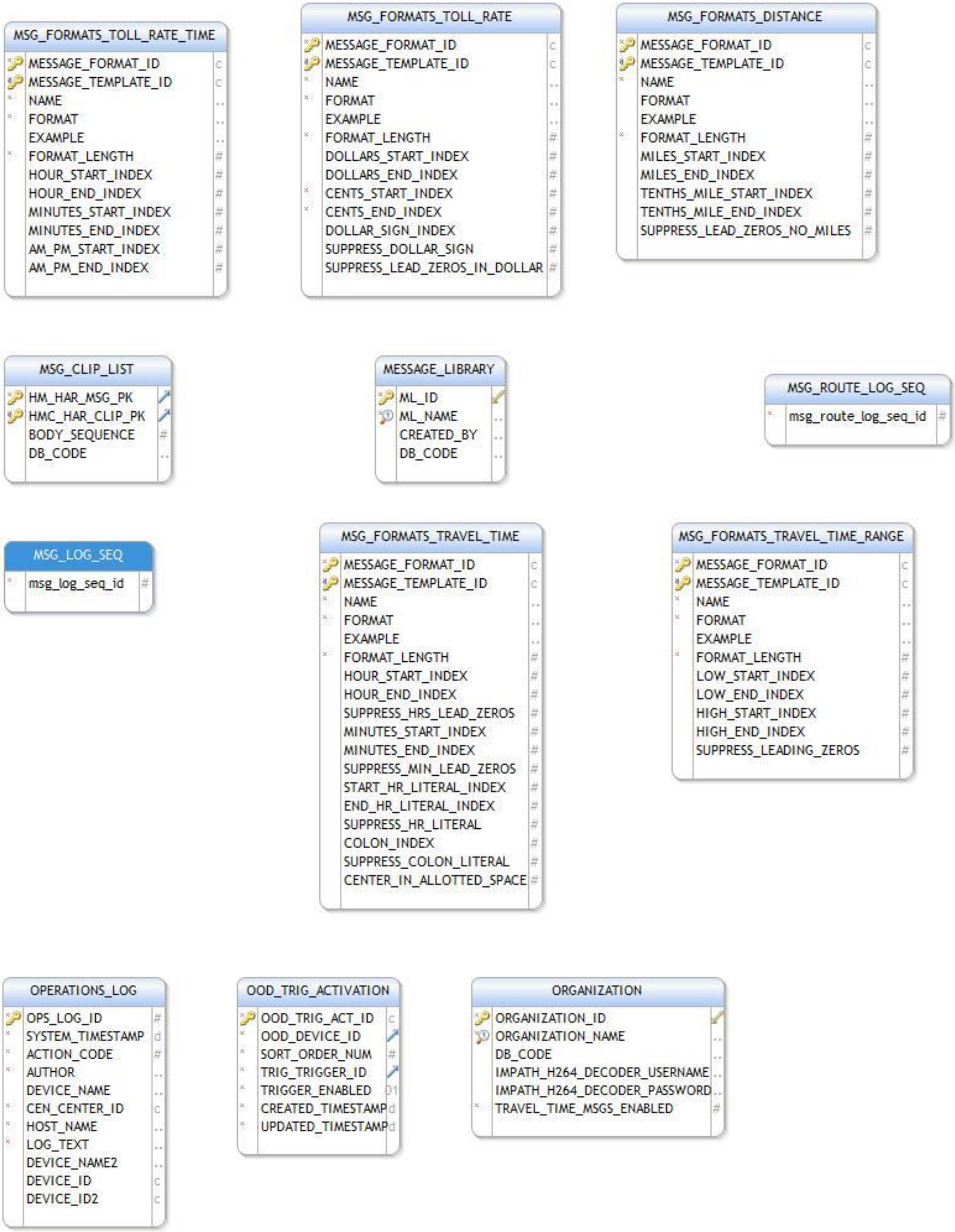
| LINK_CONNECTION | |
|---|---|
| EXT_SYS_NAME | .. |
| EXT_LINK_ID | .. |
| EXT_SYS_NAME_UPSTREAM | .. |
| EXT_LINK_ID_UPSTREAM | .. |
| GAP_LENGTH_MILLI_MILES | # |
| CREATED_TIMESTAMP | d |
| UPDATED_TIMESTAMP | d |

| LINK_QUEUE_EXCLUSION | |
|---|---|
| EXT_SYS_NAME | .. |
| EXT_LINK_ID | .. |
| CREATED_TIMESTAMP | d |
| UPDATED_TIMESTAMP | d |

| LINK_DATA_IMPORT | |
|---|---|
| IMPORT_ID | |
| SYSTEM_TIMESTAMP | d |
| EXT_SYS_NAME | .. |

| LINK_TRAVEL_TIME | |
|---|---|
| RL_LINK_ID | c |
| LINK_TRAVEL_TIME_EFF_TIME | d |
| LINK_TRAVEL_TIME_SECS | # |
| LINK_TRAVEL_TIME_QUAL | # |
| LINK_TRAVEL_TIME_TREND | # |

| LINK_CONNECTION_bak_Sep2016 | |
|---|---|
| EXT_SYS_NAME | .. |
| EXT_LINK_ID | .. |
| EXT_SYS_NAME_UPSTREAM | .. |
| EXT_LINK_ID_UPSTREAM | .. |
| GAP_LENGTH_MILLI_MILES | # |
| CREATED_TIMESTAMP | d |
| UPDATED_TIMESTAMP | d |



MSG_FORMATS_TOLL_RATE_TIME
- MESSAGE_FORMAT_ID
- MESSAGE_TEMPLATE_ID
- NAME
- FORMAT
- EXAMPLE
- FORMAT_LENGTH
- HOUR_START_INDEX
- HOUR_END_INDEX
- MINUTES_START_INDEX
- MINUTES_END_INDEX
- AM_PM_START_INDEX
- AM_PM_END_INDEX

MSG_FORMATS_TOLL_RATE
- MESSAGE_FORMAT_ID
- MESSAGE_TEMPLATE_ID
- NAME
- FORMAT
- EXAMPLE
- FORMAT_LENGTH
- DOLLARS_START_INDEX
- DOLLARS_END_INDEX
- CENTS_START_INDEX
- CENTS_END_INDEX
- DOLLAR_SIGN_INDEX
- SUPPRESS_DOLLAR_SIGN
- SUPPRESS_LEAD_ZEROS_IN_DOLLAR

MSG_FORMATS_DISTANCE
- MESSAGE_FORMAT_ID
- MESSAGE_TEMPLATE_ID
- NAME
- FORMAT
- EXAMPLE
- FORMAT_LENGTH
- MILES_START_INDEX
- MILES_END_INDEX
- TENTHS_MILE_START_INDEX
- TENTHS_MILE_END_INDEX
- SUPPRESS_LEAD_ZEROS_NO_MILES

MSG_CLIP_LIST
- HM_HAR_MSG_PK
- HMC_HAR_CLIP_PK
- BODY_SEQUENCE
- DB_CODE

MESSAGE_LIBRARY
- ML_ID
- ML_NAME
- CREATED_BY
- DB_CODE

MSG_ROUTE_LOG_SEQ
- msg_route_log_seq_id

MSG_LOG_SEQ
- msg_log_seq_id

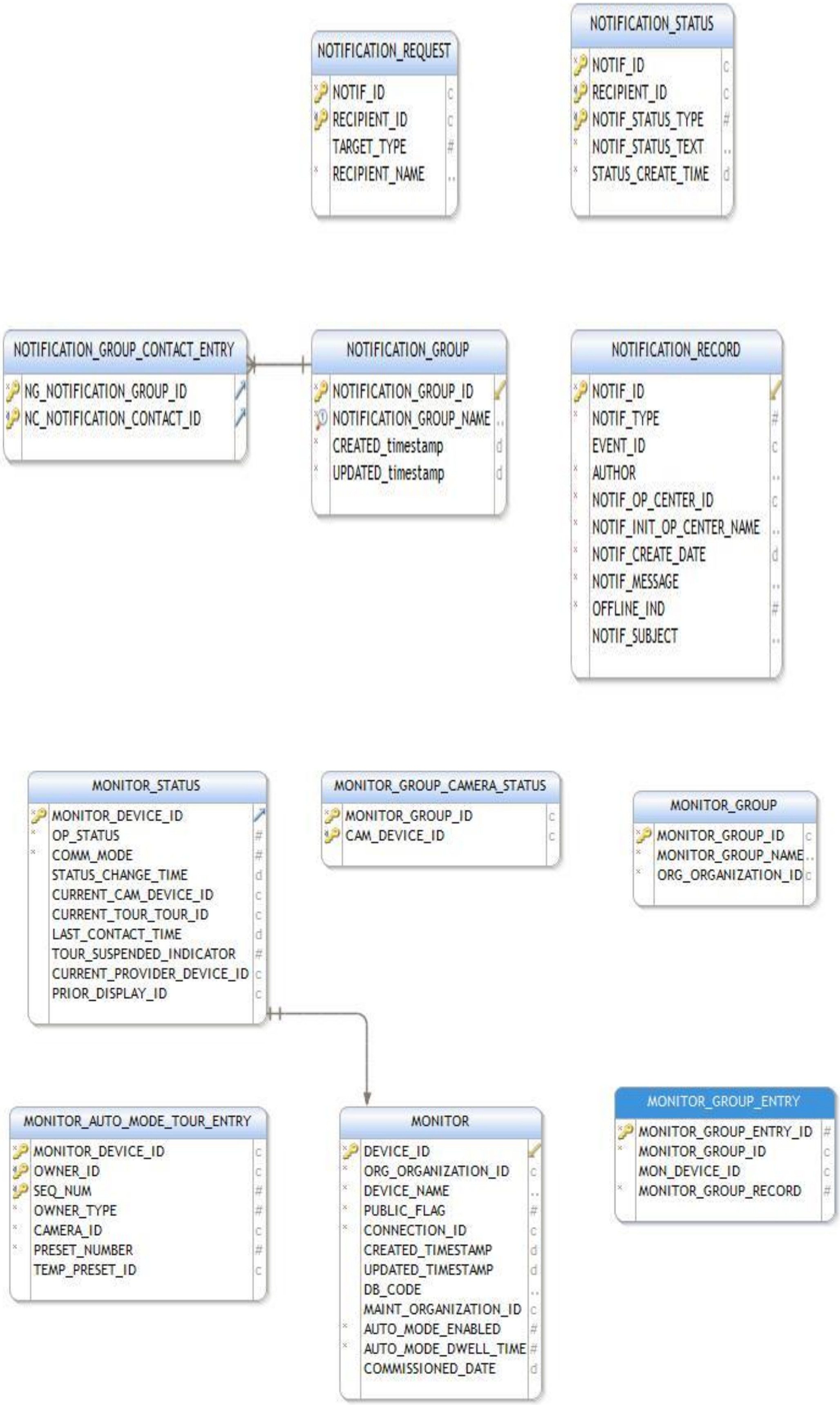
MSG_FORMATS_TRAVEL_TIME
- MESSAGE_FORMAT_ID
- MESSAGE_TEMPLATE_ID
- NAME
- FORMAT
- EXAMPLE
- FORMAT_LENGTH
- HOUR_START_INDEX
- HOUR_END_INDEX
- SUPPRESS_HRS_LEAD_ZEROS
- MINUTES_START_INDEX
- MINUTES_END_INDEX
- SUPPRESS_MIN_LEAD_ZEROS
- START_HR_LITERAL_INDEX
- END_HR_LITERAL_INDEX
- SUPPRESS_HR_LITERAL
- COLON_INDEX
- SUPPRESS_COLON_LITERAL
- CENTER_IN_ALLOTTED_SPACE

MSG_FORMATS_TRAVEL_TIME_RANGE
- MESSAGE_FORMAT_ID
- MESSAGE_TEMPLATE_ID
- NAME
- FORMAT
- EXAMPLE
- FORMAT_LENGTH
- LOW_START_INDEX
- LOW_END_INDEX
- HIGH_START_INDEX
- HIGH_END_INDEX
- SUPPRESS_LEADING_ZEROS

OPERATIONS_LOG
- OPS_LOG_ID
- SYSTEM_TIMESTAMP
- ACTION_CODE
- AUTHOR
- DEVICE_NAME
- CEN_CENTER_ID
- HOST_NAME
- LOG_TEXT
- DEVICE_NAME2
- DEVICE_ID
- DEVICE_ID2

OOD_TRIG_ACTIVATION
- OOD_TRIG_ACT_ID
- OOD_DEVICE_ID
- SORT_ORDER_NUM
- TRIG_TRIGGER_ID
- TRIGGER_ENABLED
- CREATED_TIMESTAMP
- UPDATED_TIMESTAMP

ORGANIZATION
- ORGANIZATION_ID
- ORGANIZATION_NAME
- DB_CODE
- IMPATH_H264_DECODER_USERNAME
- IMPATH_H264_DECODER_PASSWORD
- TRAVEL_TIME_MSGS_ENABLED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RECIPIENT_ID
TARGET_TYPE
RECIPIENT_NAME
NOTIFICATION_STATUS
NOTIF_ID
RECIPIENT_ID
NOTIF_STATUS_TYPE
NOTIF_STATUS_TEXT
STATUS_CREATE_TIME
NOTIFICATION_GROUP_CONTACT_ENTRY
NG_NOTIFICATION_GROUP_ID
NC_NOTIFICATION_CONTACT_ID
NOTIFICATION_GROUP
NOTIFICATION_GROUP_ID
NOTIFICATION_GROUP_NAME
CREATED_timestamp
UPDATED_timestamp
NOTIFICATION_RECORD
NOTIF_ID
NOTIF_TYPE
EVENT_ID
AUTHOR
NOTIF_OP_CENTER_ID
NOTIF_INIT_OP_CENTER_NAME
NOTIF_CREATE_DATE
NOTIF_MESSAGE
OFFLINE_IND
NOTIF_SUBJECT
MONITOR_STATUS
MONITOR_DEVICE_ID
OP_STATUS
COMM_MODE
STATUS_CHANGE_TIME
CURRENT_CAM_DEVICE_ID
CURRENT_TOUR_TOUR_ID
LAST_CONTACT_TIME
TOUR_SUSPENDED_INDICATOR
CURRENT_PROVIDER_DEVICE_ID
PRIOR_DISPLAY_ID
MONITOR_GROUP_CAMERA_STATUS
MONITOR_GROUP_ID
CAM_DEVICE_ID
MONITOR_GROUP
MONITOR_GROUP_ID
MONITOR_GROUP_NAME
ORG_ORGANIZATION_ID
MONITOR_AUTO_MODE_TOUR_ENTRY
MONITOR_DEVICE_ID
OWNER_ID
SEQ_NUM
OWNER_TYPE
CAMERA_ID
PRESET_NUMBER
TEMP_PRESET_ID
MONITOR
DEVICE_ID
ORG_ORGANIZATION_ID
DEVICE_NAME
PUBLIC_FLAG
CONNECTION_ID
CREATED_TIMESTAMP
UPDATED_TIMESTAMP
DB_CODE
MAINT_ORGANIZATION_ID
AUTO_MODE_ENABLED
AUTO_MODE_DWELL_TIME
COMMISSIONED_DATE
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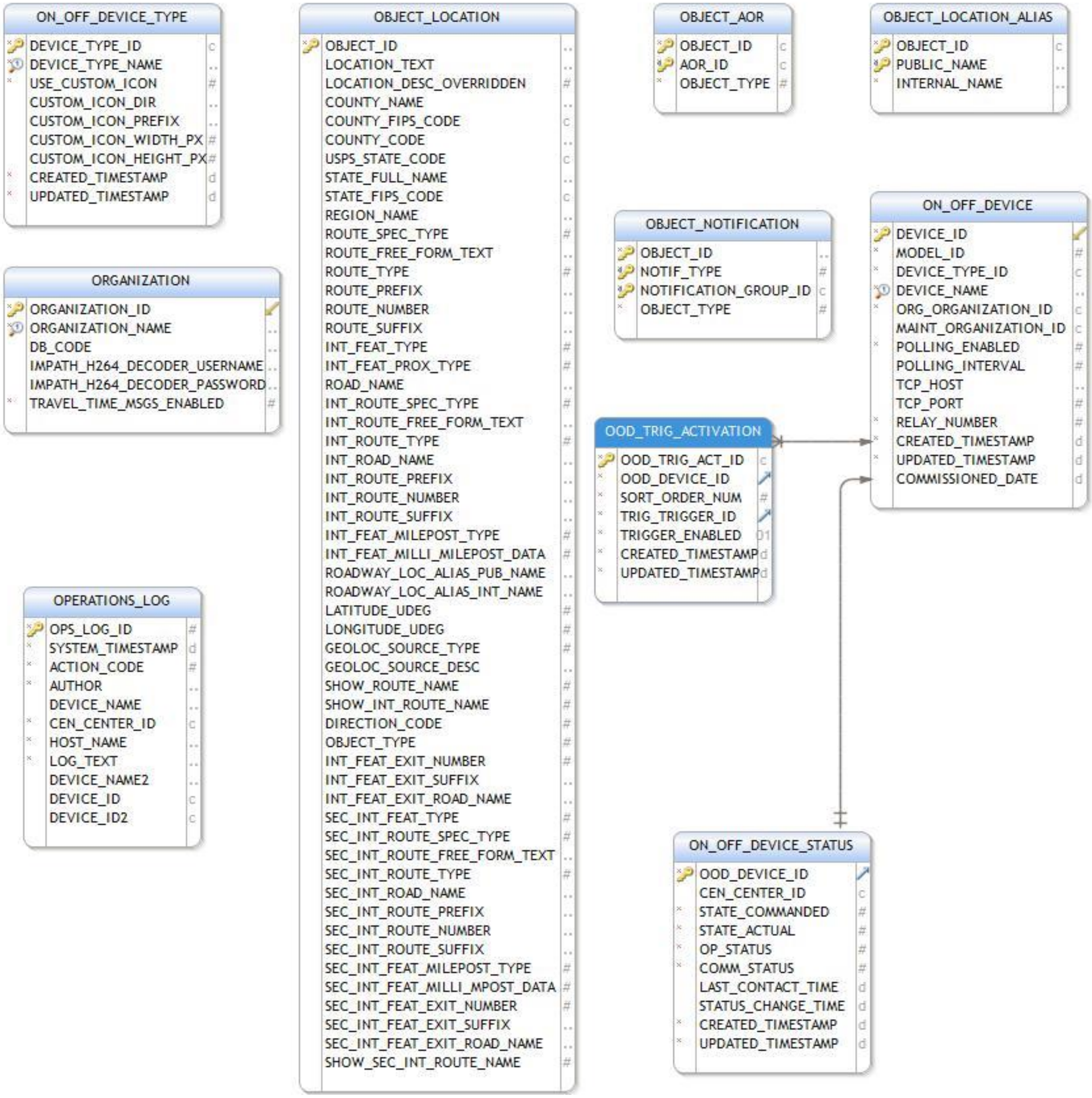
MONITOR_GROUP_ENTRY_ID
MONITOR_GROUP_ID
MON_DEVICE_ID
MONITOR_GROUP_RECORD



ON_OFF_DEVICE_TYPE

| | |
|---|---|
| DEVICE_TYPE_ID | c |
| DEVICE_TYPE_NAME | .. |
| USE_CUSTOM_ICON | # |
| CUSTOM_ICON_DIR | .. |
| CUSTOM_ICON_PREFIX | .. |
| CUSTOM_ICON_WIDTH_PX | # |
| CUSTOM_ICON_HEIGHT_PX | # |
| CREATED_TIMESTAMP | d |
| UPDATED_TIMESTAMP | d |

ORGANIZATION

| | |
|---|---|
| ORGANIZATION_ID | |
| ORGANIZATION_NAME | .. |
| DB_CODE | .. |
| IMPATH_H264_DECODER_USERNAME | .. |
| IMPATH_H264_DECODER_PASSWORD | .. |
| TRAVEL_TIME_MSGS_ENABLED | # |

OPERATIONS_LOG

| | |
|---|---|
| OPS_LOG_ID | # |
| SYSTEM_TIMESTAMP | d |
| ACTION_CODE | # |
| AUTHOR | .. |
| DEVICE_NAME | .. |
| CEN_CENTER_ID | c |
| HOST_NAME | .. |
| LOG_TEXT | .. |
| DEVICE_NAME2 | .. |
| DEVICE_ID | c |
| DEVICE_ID2 | c |

OBJECT_LOCATION

| | |
|---|---|
| OBJECT_ID | .. |
| LOCATION_TEXT | .. |
| LOCATION_DESC_OVERRIDDEN | # |
| COUNTY_NAME | .. |
| COUNTY_FIPS_CODE | c |
| COUNTY_CODE | .. |
| USPS_STATE_CODE | c |
| STATE_FULL_NAME | .. |
| STATE_FIPS_CODE | c |
| REGION_NAME | .. |
| ROUTE_SPEC_TYPE | # |
| ROUTE_FREE_FORM_TEXT | .. |
| ROUTE_TYPE | # |
| ROUTE_PREFIX | .. |
| ROUTE_NUMBER | .. |
| ROUTE_SUFFIX | .. |
| INT_FEAT_TYPE | # |
| INT_FEAT_PROX_TYPE | # |
| ROAD_NAME | .. |
| INT_ROUTE_SPEC_TYPE | # |
| INT_ROUTE_FREE_FORM_TEXT | .. |
| INT_ROUTE_TYPE | # |
| INT_ROAD_NAME | .. |
| INT_ROUTE_PREFIX | .. |
| INT_ROUTE_NUMBER | .. |
| INT_ROUTE_SUFFIX | .. |
| INT_FEAT_MILEPOST_TYPE | # |
| INT_FEAT_MILLI_MILEPOST_DATA | # |
| ROADWAY_LOC_ALIAS_PUB_NAME | .. |
| ROADWAY_LOC_ALIAS_INT_NAME | .. |
| LATITUDE_UDEG | # |
| LONGITUDE_UDEG | # |
| GEOLOC_SOURCE_TYPE | # |
| GEOLOC_SOURCE_DESC | .. |
| SHOW_ROUTE_NAME | # |
| SHOW_INT_ROUTE_NAME | # |
| DIRECTION_CODE | # |
| OBJECT_TYPE | # |
| INT_FEAT_EXIT_NUMBER | # |
| INT_FEAT_EXIT_SUFFIX | .. |
| INT_FEAT_EXIT_ROAD_NAME | .. |
| SEC_INT_FEAT_TYPE | # |
| SEC_INT_ROUTE_SPEC_TYPE | # |
| SEC_INT_ROUTE_FREE_FORM_TEXT | .. |
| SEC_INT_ROUTE_TYPE | # |
| SEC_INT_ROAD_NAME | .. |
| SEC_INT_ROUTE_PREFIX | .. |
| SEC_INT_ROUTE_NUMBER | .. |
| SEC_INT_ROUTE_SUFFIX | .. |
| SEC_INT_FEAT_MILEPOST_TYPE | # |
| SEC_INT_FEAT_MILLI_MPOST_DATA | # |
| SEC_INT_FEAT_EXIT_NUMBER | # |
| SEC_INT_FEAT_EXIT_SUFFIX | .. |
| SEC_INT_FEAT_EXIT_ROAD_NAME | .. |
| SHOW_SEC_INT_ROUTE_NAME | # |

OBJECT_AOR

| | |
|---|---|
| OBJECT_ID | c |
| AOR_ID | c |
| OBJECT_TYPE | # |

OBJECT_LOCATION_ALIAS

| | |
|---|---|
| OBJECT_ID | c |
| PUBLIC_NAME | .. |
| INTERNAL_NAME | .. |

OBJECT_NOTIFICATION

| | |
|---|---|
| OBJECT_ID | .. |
| NOTIF_TYPE | # |
| NOTIFICATION_GROUP_ID | c |
| OBJECT_TYPE | # |

OOD_TRIG_ACTIVATION

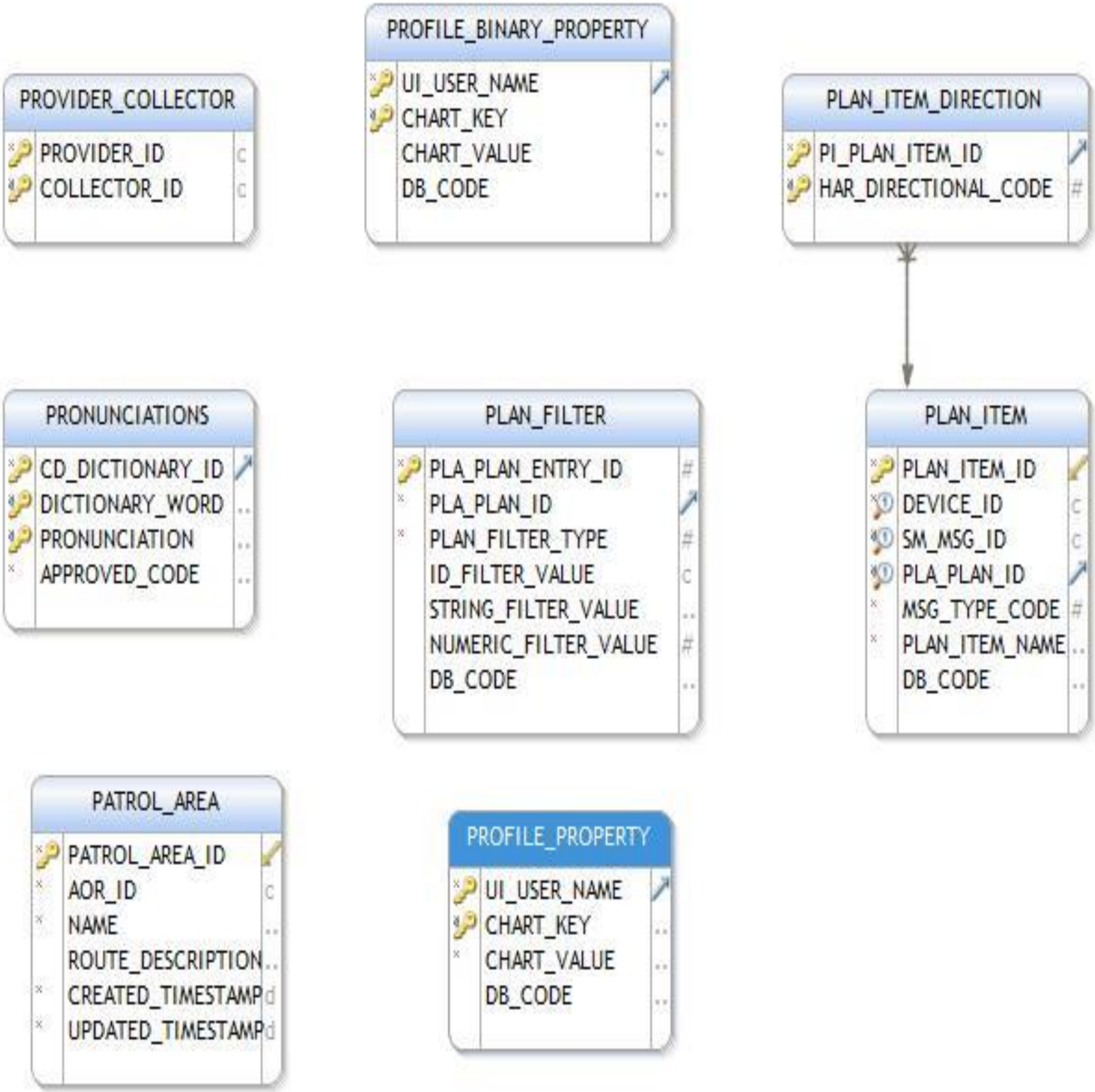
| | |
|---|---|
| OOD_TRIG_ACT_ID | c |
| OOD_DEVICE_ID | |
| SORT_ORDER_NUM | # |
| TRIG_TRIGGER_ID | |
| TRIGGER_ENABLED | 01 |
| CREATED_TIMESTAMP | d |
| UPDATED_TIMESTAMP | d |

ON_OFF_DEVICE

| | |
|---|---|
| DEVICE_ID | |
| MODEL_ID | # |
| DEVICE_TYPE_ID | c |
| DEVICE_NAME | .. |
| ORG_ORGANIZATION_ID | c |
| MAINT_ORGANIZATION_ID | c |
| POLLING_ENABLED | # |
| POLLING_INTERVAL | # |
| TCP_HOST | .. |
| TCP_PORT | # |
| RELAY_NUMBER | # |
| CREATED_TIMESTAMP | d |
| UPDATED_TIMESTAMP | d |
| COMMISSIONED_DATE | d |

ON_OFF_DEVICE_STATUS

| | |
|---|---|
| OOD_DEVICE_ID | |
| CEN_CENTER_ID | c |
| STATE_COMMANDED | # |
| STATE_ACTUAL | # |
| OP_STATUS | # |
| COMM_STATUS | # |
| LAST_CONTACT_TIME | d |
| STATUS_CHANGE_TIME | d |
| CREATED_TIMESTAMP | d |
| UPDATED_TIMESTAMP | d |


PROFILE_BINARY_PROPERTY
UI_USER_NAME
CHART_KEY
CHART_VALUE
DB_CODE
PROVIDER_COLLECTOR
PROVIDER_ID
COLLECTOR_ID
PLAN_ITEM_DIRECTION
PI_PLAN_ITEM_ID
HAR_DIRECTIONAL_CODE
PRONUNCIATIONS
CD_DICTIONARY_ID
DICTIONARY_WORD
PRONUNCIATION
APPROVED_CODE
PLAN_FILTER
PLA_PLAN_ENTRY_ID
PLA_PLAN_ID
PLAN_FILTER_TYPE
ID_FILTER_VALUE
STRING_FILTER_VALUE
NUMERIC_FILTER_VALUE
DB_CODE
PLAN_ITEM
PLAN_ITEM_ID
DEVICE_ID
SM_MSG_ID
PLA_PLAN_ID
MSG_TYPE_CODE
PLAN_ITEM_NAME
DB_CODE
PATROL_AREA
PATROL_AREA_ID
AOR_ID
NAME
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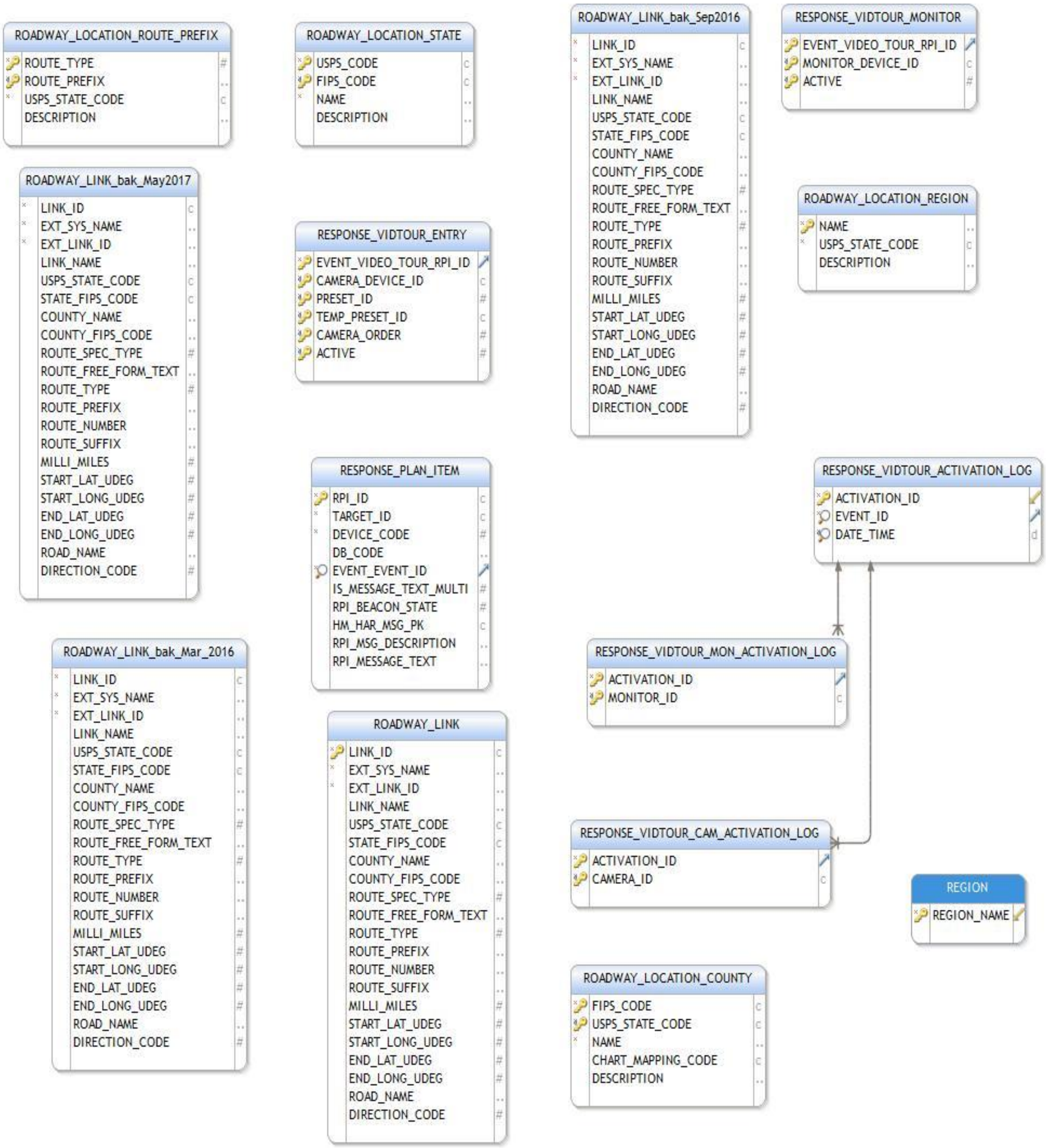
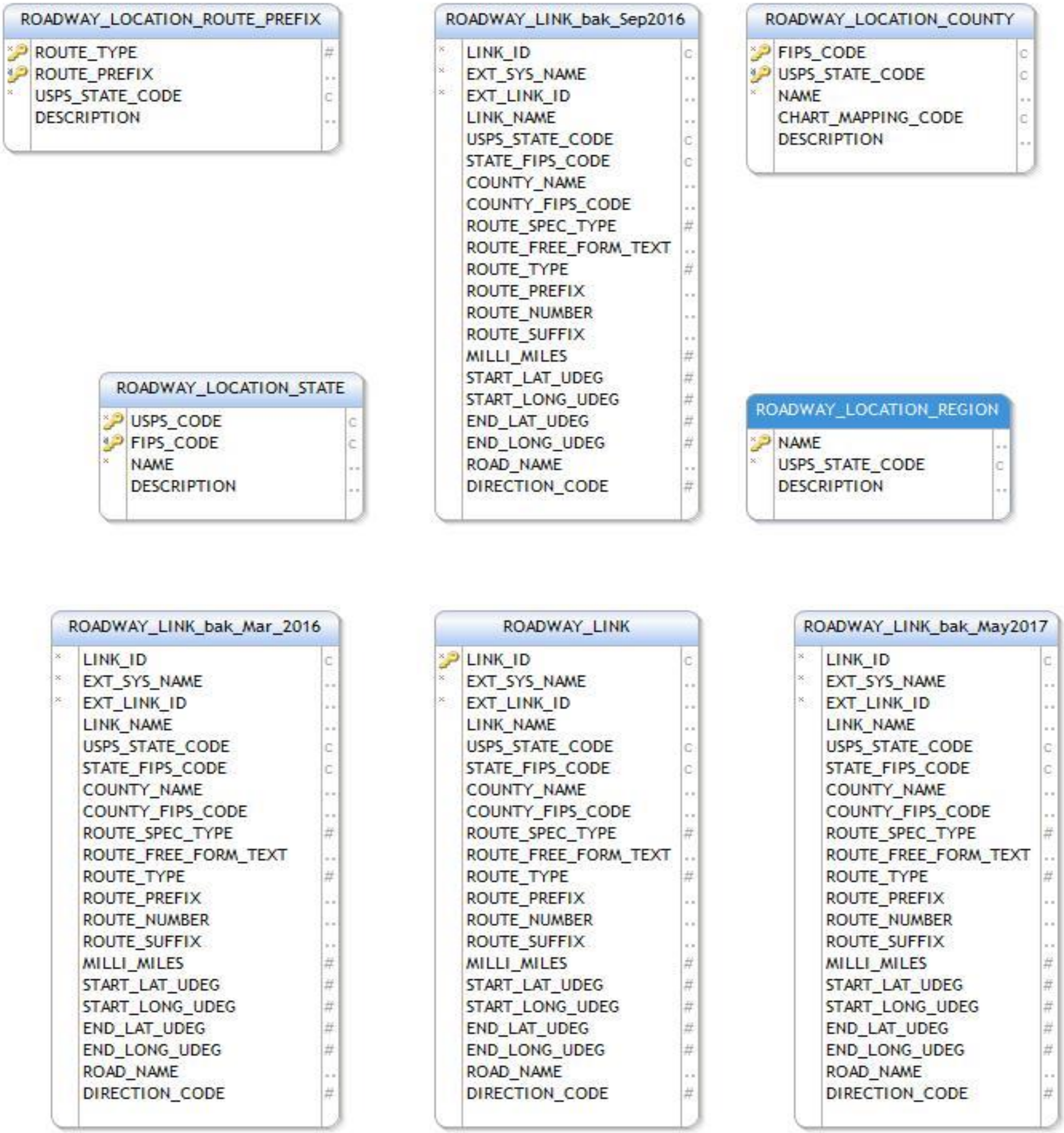
CREATED_TIMESTAMP
UPDATED_TIMESTAMP
PROFILE_PROPERTY
UI_USER_NAME
CHART_KEY
CHART_VALUE
DB_CODE


ROADWAY_LOCATION_ROUTE_PREFIX
ROUTE_TYPE
ROUTE_PREFIX
USPS_STATE_CODE
DESCRIPTION
ROADWAY_LOCATION_STATE
USPS_CODE
FIPS_CODE
NAME
DESCRIPTION
ROADWAY_LINK_bak_Sep2016
LINK_ID
EXT_SYS_NAME
EXT_LINK_ID
LINK_NAME
USPS_STATE_CODE
STATE_FIPS_CODE
COUNTY_NAME
COUNTY_FIPS_CODE
ROUTE_SPEC_TYPE
ROUTE_FREE_FORM_TEXT
ROUTE_TYPE
ROUTE_PREFIX
ROUTE_NUMBER
ROUTE_SUFFIX
MILLI_MILES
START_LAT_UDEG
START_LONG_UDEG
END_LAT_UDEG
END_LONG_UDEG
ROAD_NAME
DIRECTION_CODE
RESPONSE_VIDTOUR_MONITOR
EVENT_VIDEO_TOUR_RPI_ID
MONITOR_DEVICE_ID
ACTIVE
ROADWAY_LINK_bak_May2017
LINK_ID
EXT_SYS_NAME
EXT_LINK_ID
LINK_NAME
USPS_STATE_CODE
STATE_FIPS_CODE
COUNTY_NAME
COUNTY_FIPS_CODE
ROUTE_SPEC_TYPE
ROUTE_FREE_FORM_TEXT
ROUTE_TYPE
ROUTE_PREFIX
ROUTE_NUMBER
ROUTE_SUFFIX
MILLI_MILES
START_LAT_UDEG
START_LONG_UDEG
END_LAT_UDEG
END_LONG_UDEG
ROAD_NAME
DIRECTION_CODE
RESPONSE_VIDTOUR_ENTRY
EVENT_VIDEO_TOUR_RPI_ID
CAMERA_DEVICE_ID
PRESET_ID
TEMP_PRESET_ID
CAMERA_ORDER
ACTIVE
ROADWAY_LOCATION_REGION
NAME
USPS_STATE_CODE
DESCRIPTION
RESPONSE_PLAN_ITEM
RPI_ID
TARGET_ID
DEVICE_CODE
DB_CODE
EVENT_EVENT_ID
IS_MESSAGE_TEXT_MULTI
RPI_BEACON_STATE
HM_HAR_MSG_PK
RPI_MSG_DESCRIPTION
RPI_MESSAGE_TEXT
RESPONSE_VIDTOUR_ACTIVATION_LOG
ACTIVATION_ID
EVENT_ID
DATE_TIME
ROADWAY_LINK_bak_Mar_2016
LINK_ID
EXT_SYS_NAME
EXT_LINK_ID
LINK_NAME
USPS_STATE_CODE
STATE_FIPS_CODE
COUNTY_NAME
COUNTY_FIPS_CODE
ROUTE_SPEC_TYPE
ROUTE_FREE_FORM_TEXT
ROUTE_TYPE
ROUTE_PREFIX
ROUTE_NUMBER
ROUTE_SUFFIX
MILLI_MILES
START_LAT_UDEG
START_LONG_UDEG
END_LAT_UDEG
END_LONG_UDEG
ROAD_NAME
DIRECTION_CODE
RESPONSE_VIDTOUR_MON_ACTIVATION_LOG
ACTIVATION_ID
MONITOR_ID
ROADWAY_LINK
LINK_ID
EXT_SYS_NAME
EXT_LINK_ID
LINK_NAME
USPS_STATE_CODE
STATE_FIPS_CODE
COUNTY_NAME
COUNTY_FIPS_CODE
ROUTE_SPEC_TYPE
ROUTE_FREE_FORM_TEXT
ROUTE_TYPE
ROUTE_PREFIX
ROUTE_NUMBER
ROUTE_SUFFIX
MILLI_MILES
START_LAT_UDEG
START_LONG_UDEG
END_LAT_UDEG
END_LONG_UDEG
ROAD_NAME
DIRECTION_CODE
RESPONSE_VIDTOUR_CAM_ACTIVATION_LOG
ACTIVATION_ID
CAMERA_ID
REGION
REGION_NAME
ROADWAY_LOCATION_COUNTY
FIPS_CODE
USPS_STATE_CODE
NAME
CHART_MAPPING_CODE
DESCRIPTION



**ROADWAY_LOCATION_ROUTE_PREFIX**

| | | |
|---|---|---|
| 🔑 | ROUTE_TYPE | # |
| 🔑 | ROUTE_PREFIX | .. |
| × | USPS_STATE_CODE | C |
| | DESCRIPTION | .. |

**ROADWAY_LINK_bak_Sep2016**

| | | |
|---|---|---|
| × | LINK_ID | C |
| × | EXT_SYS_NAME | .. |
| × | EXT_LINK_ID | .. |
| | LINK_NAME | .. |
| | USPS_STATE_CODE | C |
| | STATE_FIPS_CODE | C |
| | COUNTY_NAME | .. |
| | COUNTY_FIPS_CODE | .. |
| | ROUTE_SPEC_TYPE | # |
| | ROUTE_FREE_FORM_TEXT | .. |
| | ROUTE_TYPE | # |
| | ROUTE_PREFIX | .. |
| | ROUTE_NUMBER | .. |
| | ROUTE_SUFFIX | .. |
| | MILLI_MILES | # |
| | START_LAT_UDEG | # |
| | START_LONG_UDEG | # |
| | END_LAT_UDEG | # |
| | END_LONG_UDEG | # |
| | ROAD_NAME | .. |
| | DIRECTION_CODE | # |

**ROADWAY_LOCATION_COUNTY**

| | | |
|---|---|---|
| 🔑 | FIPS_CODE | C |
| 🔑 | USPS_STATE_CODE | C |
| × | NAME | .. |
| | CHART_MAPPING_CODE | C |
| | DESCRIPTION | .. |

**ROADWAY_LOCATION_STATE**

| | | |
|---|---|---|
| 🔑 | USPS_CODE | C |
| 🔑 | FIPS_CODE | C |
| × | NAME | .. |
| | DESCRIPTION | .. |

**ROADWAY_LOCATION_REGION**

| | | |
|---|---|---|
| 🔑 | NAME | .. |
| × | USPS_STATE_CODE | C |
| | DESCRIPTION | .. |

**ROADWAY_LINK_bak_Mar_2016**

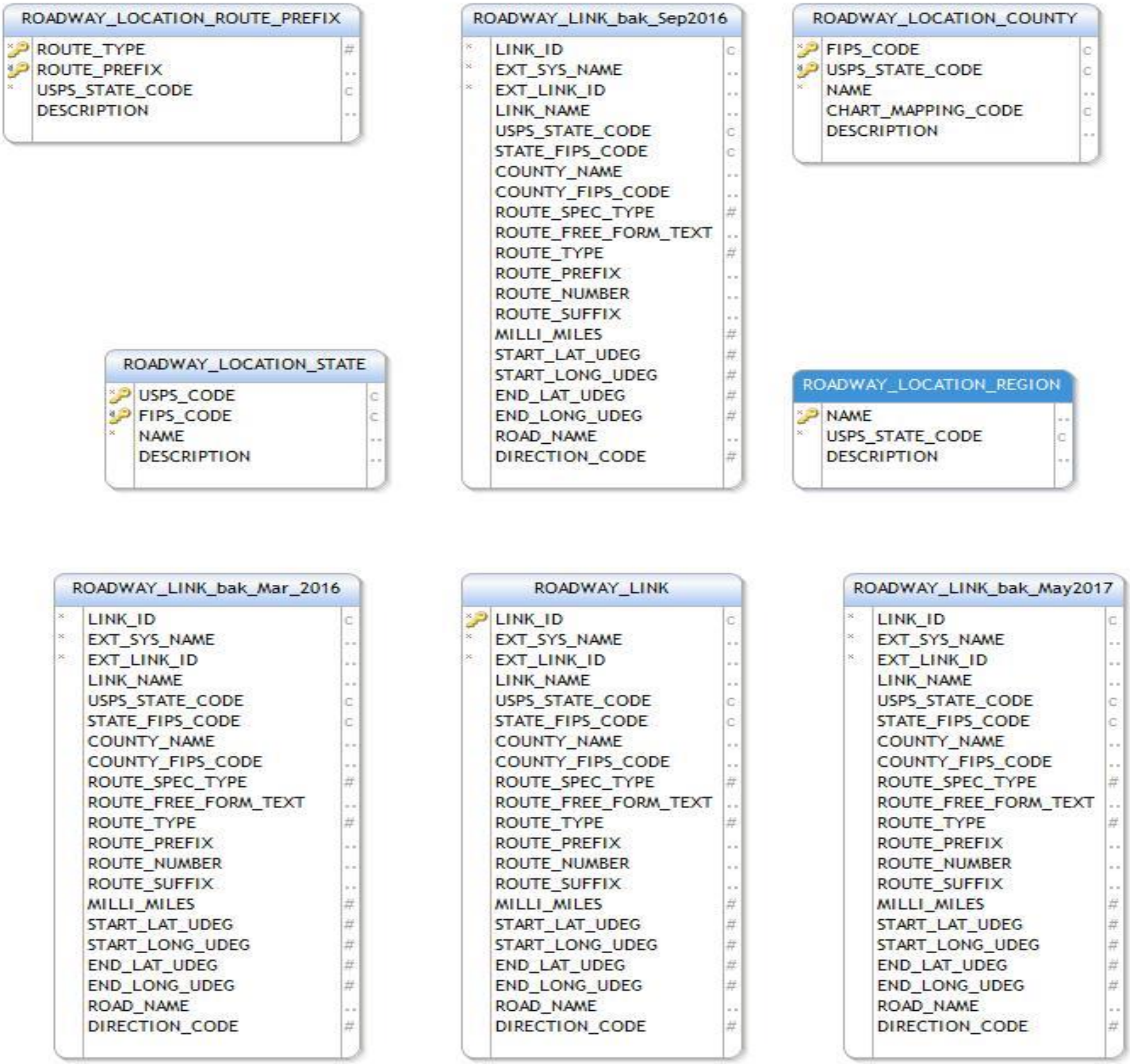
| | | |
|---|---|---|
| × | LINK_ID | C |
| × | EXT_SYS_NAME | .. |
| × | EXT_LINK_ID | .. |
| | LINK_NAME | .. |
| | USPS_STATE_CODE | C |
| | STATE_FIPS_CODE | C |
| | COUNTY_NAME | .. |
| | COUNTY_FIPS_CODE | .. |
| | ROUTE_SPEC_TYPE | # |
| | ROUTE_FREE_FORM_TEXT | .. |
| | ROUTE_TYPE | # |
| | ROUTE_PREFIX | .. |
| | ROUTE_NUMBER | .. |
| | ROUTE_SUFFIX | .. |
| | MILLI_MILES | # |
| | START_LAT_UDEG | # |
| | START_LONG_UDEG | # |
| | END_LAT_UDEG | # |
| | END_LONG_UDEG | # |
| | ROAD_NAME | .. |
| | DIRECTION_CODE | # |

**ROADWAY_LINK**

| | | |
|---|---|---|
| 🔑 | LINK_ID | C |
| × | EXT_SYS_NAME | .. |
| × | EXT_LINK_ID | .. |
| | LINK_NAME | .. |
| | USPS_STATE_CODE | C |
| | STATE_FIPS_CODE | C |
| | COUNTY_NAME | .. |
| | COUNTY_FIPS_CODE | .. |
| | ROUTE_SPEC_TYPE | # |
| | ROUTE_FREE_FORM_TEXT | .. |
| | ROUTE_TYPE | # |
| | ROUTE_PREFIX | .. |
| | ROUTE_NUMBER | .. |
| | ROUTE_SUFFIX | .. |
| | MILLI_MILES | # |
| | START_LAT_UDEG | # |
| | START_LONG_UDEG | # |
| | END_LAT_UDEG | # |
| | END_LONG_UDEG | # |
| | ROAD_NAME | .. |
| | DIRECTION_CODE | # |

**ROADWAY_LINK_bak_May2017**

| | | |
|---|---|---|
| × | LINK_ID | C |
| × | EXT_SYS_NAME | .. |
| × | EXT_LINK_ID | .. |
| | LINK_NAME | .. |
| | USPS_STATE_CODE | C |
| | STATE_FIPS_CODE | C |
| | COUNTY_NAME | .. |
| | COUNTY_FIPS_CODE | .. |
| | ROUTE_SPEC_TYPE | # |
| | ROUTE_FREE_FORM_TEXT | .. |
| | ROUTE_TYPE | # |
| | ROUTE_PREFIX | .. |
| | ROUTE_NUMBER | .. |
| | ROUTE_SUFFIX | .. |
| | MILLI_MILES | # |
| | START_LAT_UDEG | # |
| | START_LONG_UDEG | # |
| | END_LAT_UDEG | # |
| | END_LONG_UDEG | # |
| | ROAD_NAME | .. |
| | DIRECTION_CODE | # |



| ROADWAY_LOCATION_ROUTE_PREFIX | |
|---|---|
| 🔑 ROUTE_TYPE | # |
| 🔑 ROUTE_PREFIX | .. |
| USPS_STATE_CODE | c |
| DESCRIPTION | .. |

| ROADWAY_LINK_bak_Sep2016 | |
|---|---|
| LINK_ID | c |
| EXT_SYS_NAME | .. |
| EXT_LINK_ID | .. |
| LINK_NAME | .. |
| USPS_STATE_CODE | c |
| STATE_FIPS_CODE | c |
| COUNTY_NAME | .. |
| COUNTY_FIPS_CODE | .. |
| ROUTE_SPEC_TYPE | # |
| ROUTE_FREE_FORM_TEXT | .. |
| ROUTE_TYPE | # |
| ROUTE_PREFIX | .. |
| ROUTE_NUMBER | .. |
| ROUTE_SUFFIX | .. |
| MILLI_MILES | # |
| START_LAT_UDEG | # |
| START_LONG_UDEG | # |
| END_LAT_UDEG | # |
| END_LONG_UDEG | # |
| ROAD_NAME | .. |
| DIRECTION_CODE | # |

| ROADWAY_LOCATION_COUNTY | |
|---|---|
| 🔑 FIPS_CODE | c |
| 🔑 USPS_STATE_CODE | c |
| NAME | .. |
| CHART_MAPPING_CODE | c |
| DESCRIPTION | .. |

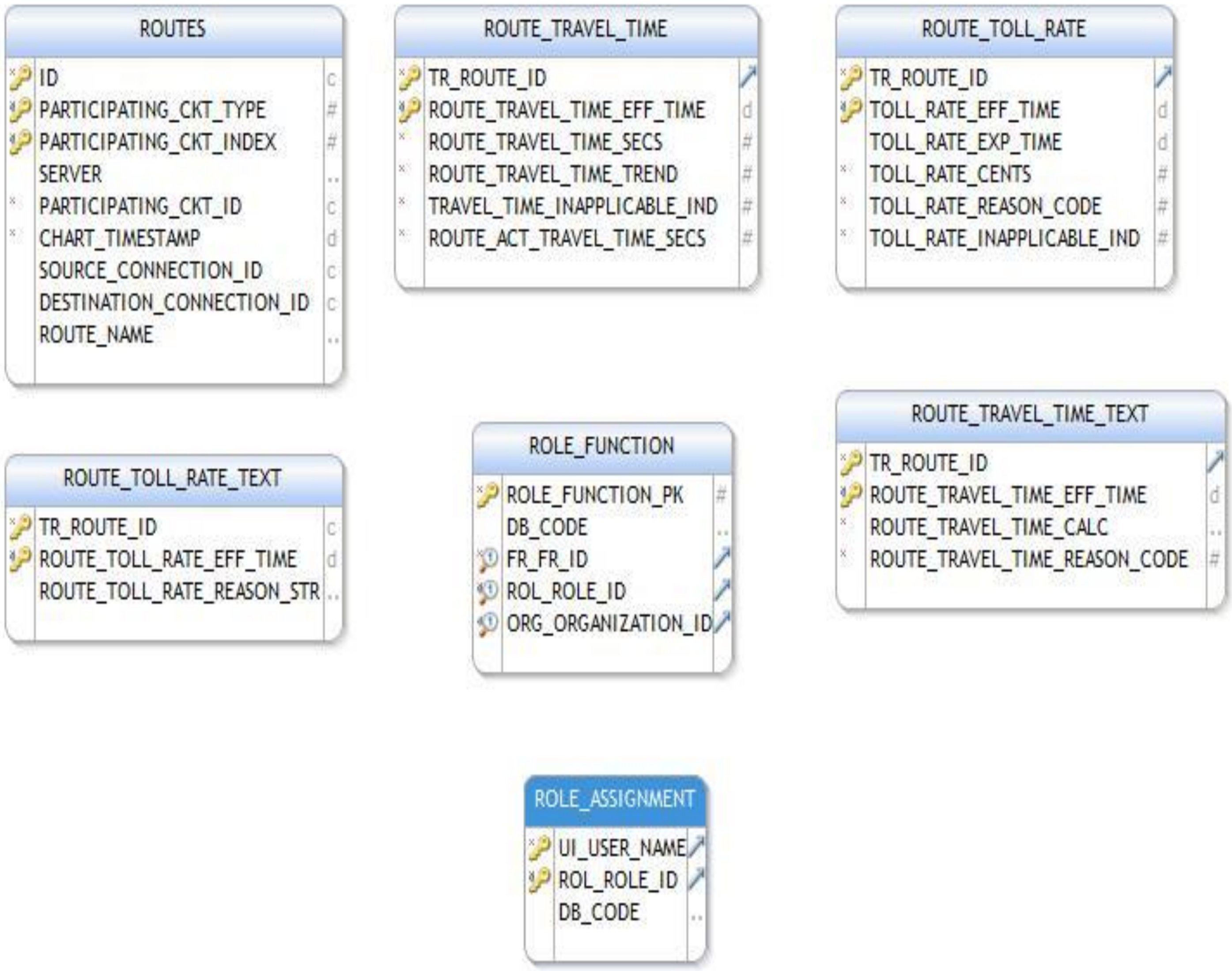
| ROADWAY_LOCATION_STATE | |
|---|---|
| 🔑 USPS_CODE | c |
| 🔑 FIPS_CODE | c |
| NAME | .. |
| DESCRIPTION | .. |

| ROADWAY_LOCATION_REGION | |
|---|---|
| 🔑 NAME | .. |
| USPS_STATE_CODE | c |
| DESCRIPTION | .. |

| ROADWAY_LINK_bak_Mar_2016 | |
|---|---|
| LINK_ID | c |
| EXT_SYS_NAME | .. |
| EXT_LINK_ID | .. |
| LINK_NAME | .. |
| USPS_STATE_CODE | c |
| STATE_FIPS_CODE | c |
| COUNTY_NAME | .. |
| COUNTY_FIPS_CODE | .. |
| ROUTE_SPEC_TYPE | # |
| ROUTE_FREE_FORM_TEXT | .. |
| ROUTE_TYPE | # |
| ROUTE_PREFIX | .. |
| ROUTE_NUMBER | .. |
| ROUTE_SUFFIX | .. |
| MILLI_MILES | # |
| START_LAT_UDEG | # |
| START_LONG_UDEG | # |
| END_LAT_UDEG | # |
| END_LONG_UDEG | # |
| ROAD_NAME | .. |
| DIRECTION_CODE | # |

| ROADWAY_LINK | |
|---|---|
| 🔑 LINK_ID | c |
| EXT_SYS_NAME | .. |
| EXT_LINK_ID | .. |
| LINK_NAME | .. |
| USPS_STATE_CODE | c |
| STATE_FIPS_CODE | c |
| COUNTY_NAME | .. |
| COUNTY_FIPS_CODE | .. |
| ROUTE_SPEC_TYPE | # |
| ROUTE_FREE_FORM_TEXT | .. |
| ROUTE_TYPE | # |
| ROUTE_PREFIX | .. |
| ROUTE_NUMBER | .. |
| ROUTE_SUFFIX | .. |
| MILLI_MILES | # |
| START_LAT_UDEG | # |
| START_LONG_UDEG | # |
| END_LAT_UDEG | # |
| END_LONG_UDEG | # |
| ROAD_NAME | .. |
| DIRECTION_CODE | # |

| ROADWAY_LINK_bak_May2017 | |
|---|---|
| LINK_ID | c |
| EXT_SYS_NAME | .. |
| EXT_LINK_ID | .. |
| LINK_NAME | .. |
| USPS_STATE_CODE | c |
| STATE_FIPS_CODE | c |
| COUNTY_NAME | .. |
| COUNTY_FIPS_CODE | .. |
| ROUTE_SPEC_TYPE | # |
| ROUTE_FREE_FORM_TEXT | .. |
| ROUTE_TYPE | # |
| ROUTE_PREFIX | .. |
| ROUTE_NUMBER | .. |
| ROUTE_SUFFIX | .. |
| MILLI_MILES | # |
| START_LAT_UDEG | # |
| START_LONG_UDEG | # |
| END_LAT_UDEG | # |
| END_LONG_UDEG | # |
| ROAD_NAME | .. |
| DIRECTION_CODE | # |



| ROUTES | |
|---|---|
| ID | c |
| PARTICIPATING_CKT_TYPE | # |
| PARTICIPATING_CKT_INDEX | # |
| SERVER | .. |
| PARTICIPATING_CKT_ID | c |
| CHART_TIMESTAMP | d |
| SOURCE_CONNECTION_ID | c |
| DESTINATION_CONNECTION_ID | c |
| ROUTE_NAME | .. |

| ROUTE_TRAVEL_TIME | |
|---|---|
| TR_ROUTE_ID | ↗ |
| ROUTE_TRAVEL_TIME_EFF_TIME | d |
| ROUTE_TRAVEL_TIME_SECS | # |
| ROUTE_TRAVEL_TIME_TREND | # |
| TRAVEL_TIME_INAPPLICABLE_IND | # |
| ROUTE_ACT_TRAVEL_TIME_SECS | # |

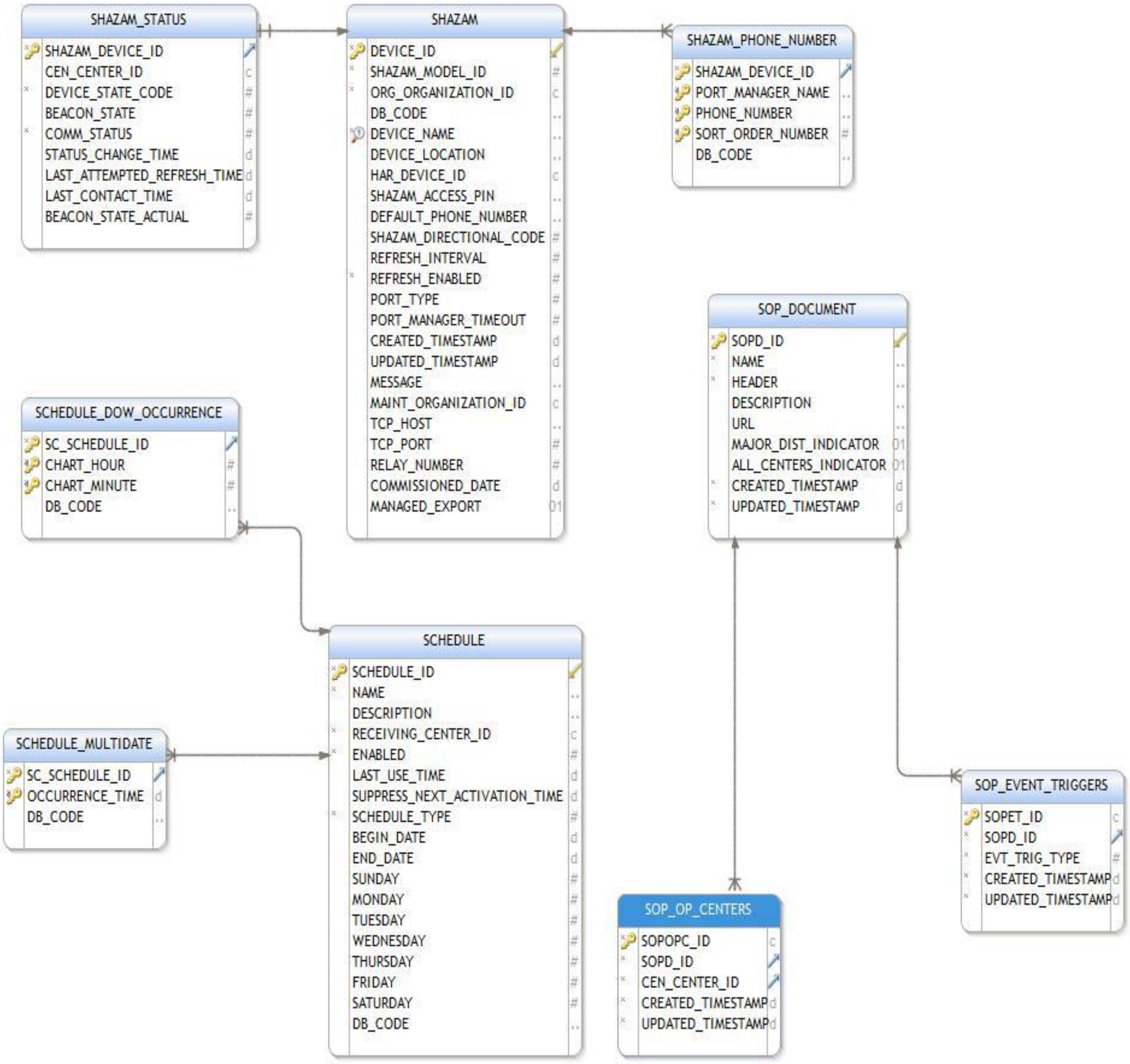
| ROUTE_TOLL_RATE | |
|---|---|
| TR_ROUTE_ID | ↗ |
| TOLL_RATE_EFF_TIME | d |
| TOLL_RATE_EXP_TIME | d |
| TOLL_RATE_CENTS | # |
| TOLL_RATE_REASON_CODE | # |
| TOLL_RATE_INAPPLICABLE_IND | # |

| ROUTE_TOLL_RATE_TEXT | |
|---|---|
| TR_ROUTE_ID | c |
| ROUTE_TOLL_RATE_EFF_TIME | d |
| ROUTE_TOLL_RATE_REASON_STR | .. |

| ROLE_FUNCTION | |
|---|---|
| ROLE_FUNCTION_PK | # |
| DB_CODE | .. |
| FR_FR_ID | ↗ |
| ROL_ROLE_ID | ↗ |
| ORG_ORGANIZATION_ID | ↗ |

| ROUTE_TRAVEL_TIME_TEXT | |
|---|---|
| TR_ROUTE_ID | ↗ |
| ROUTE_TRAVEL_TIME_EFF_TIME | d |
| ROUTE_TRAVEL_TIME_CALC | .. |
| ROUTE_TRAVEL_TIME_REASON_CODE | # |

| ROLE_ASSIGNMENT | |
|---|---|
| UI_USER_NAME | ↗ |
| ROL_ROLE_ID | ↗ |
| DB_CODE | .. |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SHAZAM_DEVICE_ID
CEN_CENTER_ID
DEVICE_STATE_CODE
BEACON_STATE
COMM_STATUS
STATUS_CHANGE_TIME
LAST_ATTEMPTED_REFRESH_TIME
LAST_CONTACT_TIME
BEACON_STATE_ACTUAL
SHAZAM
DEVICE_ID
SHAZAM_MODEL_ID
ORG_ORGANIZATION_ID
DB_CODE
DEVICE_NAME
DEVICE_LOCATION
HAR_DEVICE_ID
SHAZAM_ACCESS_PIN
DEFAULT_PHONE_NUMBER
SHAZAM_DIRECTIONAL_CODE
REFRESH_INTERVAL
REFRESH_ENABLED
PORT_TYPE
PORT_MANAGER_TIMEOUT
CREATED_TIMESTAMP
UPDATED_TIMESTAMP
MESSAGE
MAINT_ORGANIZATION_ID
TCP_HOST
TCP_PORT
RELAY_NUMBER
COMMISSIONED_DATE
MANAGED_EXPORT
SHAZAM_PHONE_NUMBER
SHAZAM_DEVICE_ID
PORT_MANAGER_NAME
PHONE_NUMBER
SORT_ORDER_NUMBER
DB_CODE
SOP_DOCUMENT
SOPD_ID
NAME
HEADER
DESCRIPTION
URL
MAJOR_DIST_INDICATOR
ALL_CENTERS_INDICATOR
CREATED_TIMESTAMP
UPDATED_TIMESTAMP
SCHEDULE_DOW_OCCURRENCE
SC_SCHEDULE_ID
CHART_HOUR
CHART_MINUTE
DB_CODE
SCHEDULE
SCHEDULE_ID
NAME
DESCRIPTION
RECEIVING_CENTER_ID
ENABLED
LAST_USE_TIME
SUPPRESS_NEXT_ACTIVATION_TIME
SCHEDULE_TYPE
BEGIN_DATE
END_DATE
SUNDAY
MONDAY
TUESDAY
WEDNESDAY
THURSDAY
FRIDAY
SATURDAY
DB_CODE
SCHEDULE_MULTIDATE
SC_SCHEDULE_ID
OCCURRENCE_TIME
DB_CODE
SOP_EVENT_TRIGGERS
SOPET_ID
SOPD_ID
EVT_TRIG_TYPE
CREATED_TIMESTAMP
UPDATED_TIMESTAMP
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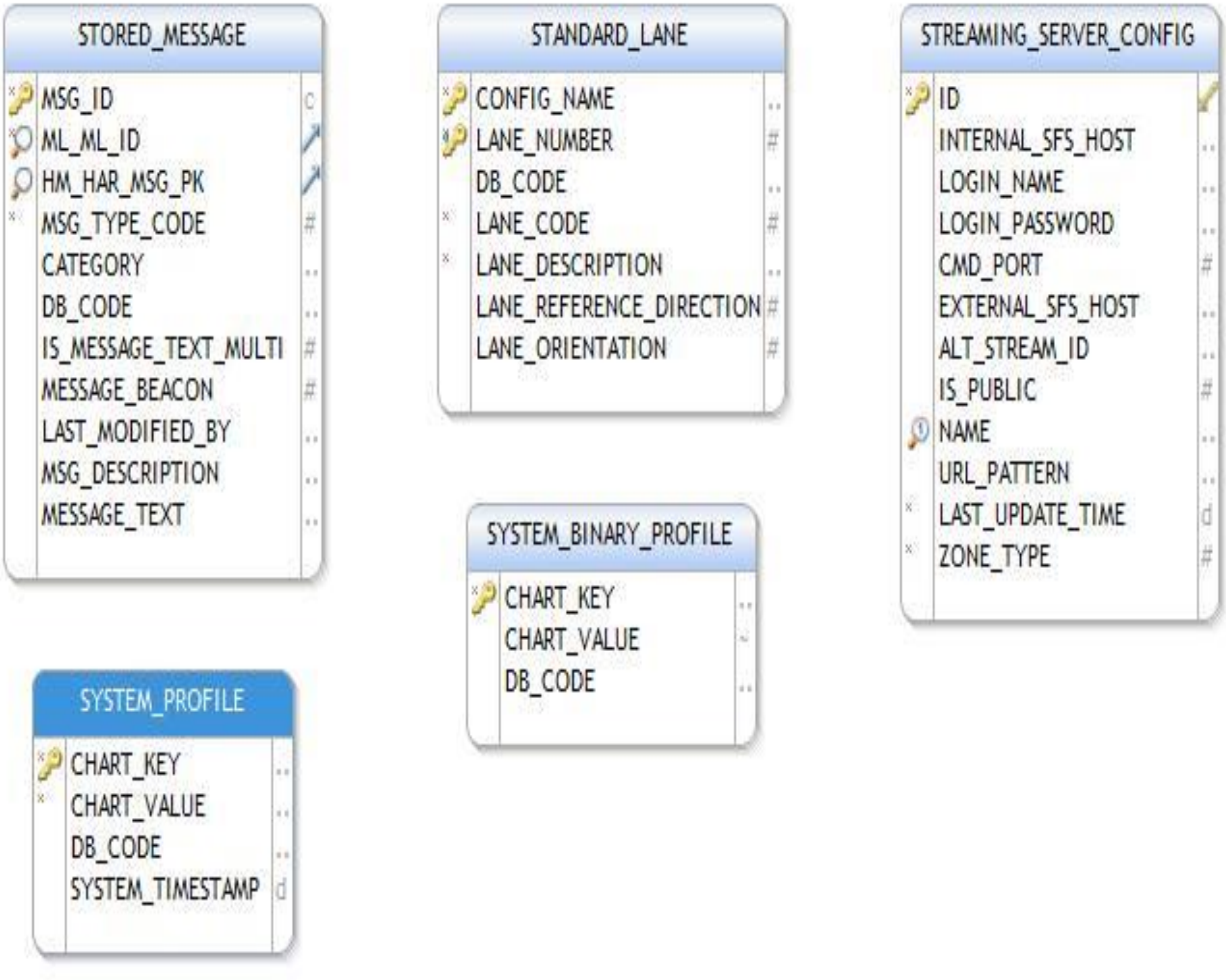
SOPOPC_ID
SOPD_ID
CEN_CENTER_ID
CREATED_TIMESTAMP
UPDATED_TIMESTAMP



STORED_MESSAGE

- MSG_ID
- ML_ML_ID
- HM_HAR_MSG_PK
- MSG_TYPE_CODE
- CATEGORY
- DB_CODE
- IS_MESSAGE_TEXT_MULTI
- MESSAGE_BEACON
- LAST_MODIFIED_BY
- MSG_DESCRIPTION
- MESSAGE_TEXT

STANDARD_LANE

- CONFIG_NAME
- LANE_NUMBER
- DB_CODE
- LANE_CODE
- LANE_DESCRIPTION
- LANE_REFERENCE_DIRECTION
- LANE_ORIENTATION

STREAMING_SERVER_CONFIG

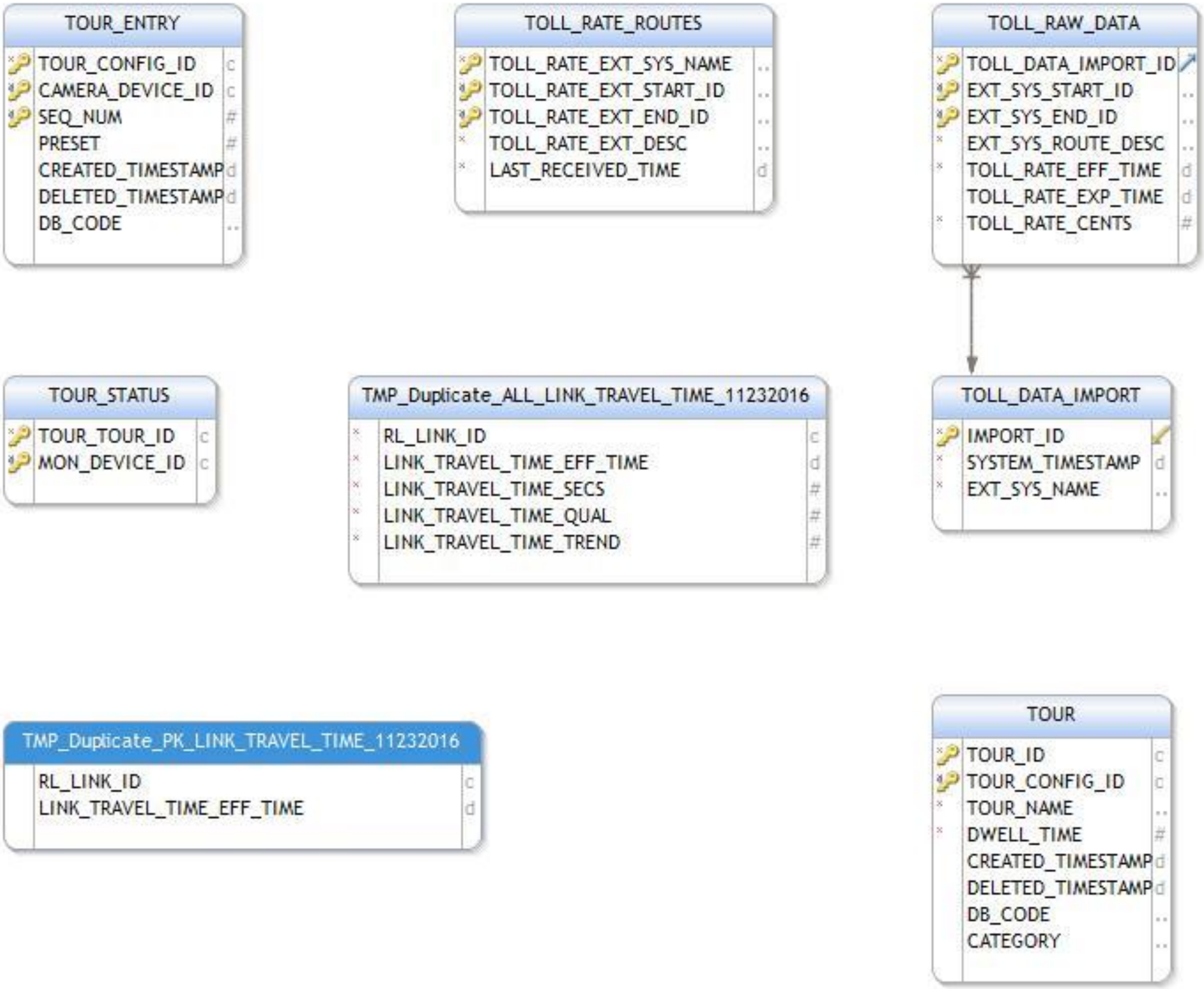
- ID
- INTERNAL_SFS_HOST
- LOGIN_NAME
- LOGIN_PASSWORD
- CMD_PORT
- EXTERNAL_SFS_HOST
- ALT_STREAM_ID
- IS_PUBLIC
- NAME
- URL_PATTERN
- LAST_UPDATE_TIME
- ZONE_TYPE

SYSTEM_BINARY_PROFILE

- CHART_KEY
- CHART_VALUE
- DB_CODE

SYSTEM_PROFILE

- CHART_KEY
- CHART_VALUE
- DB_CODE
- SYSTEM_TIMESTAMP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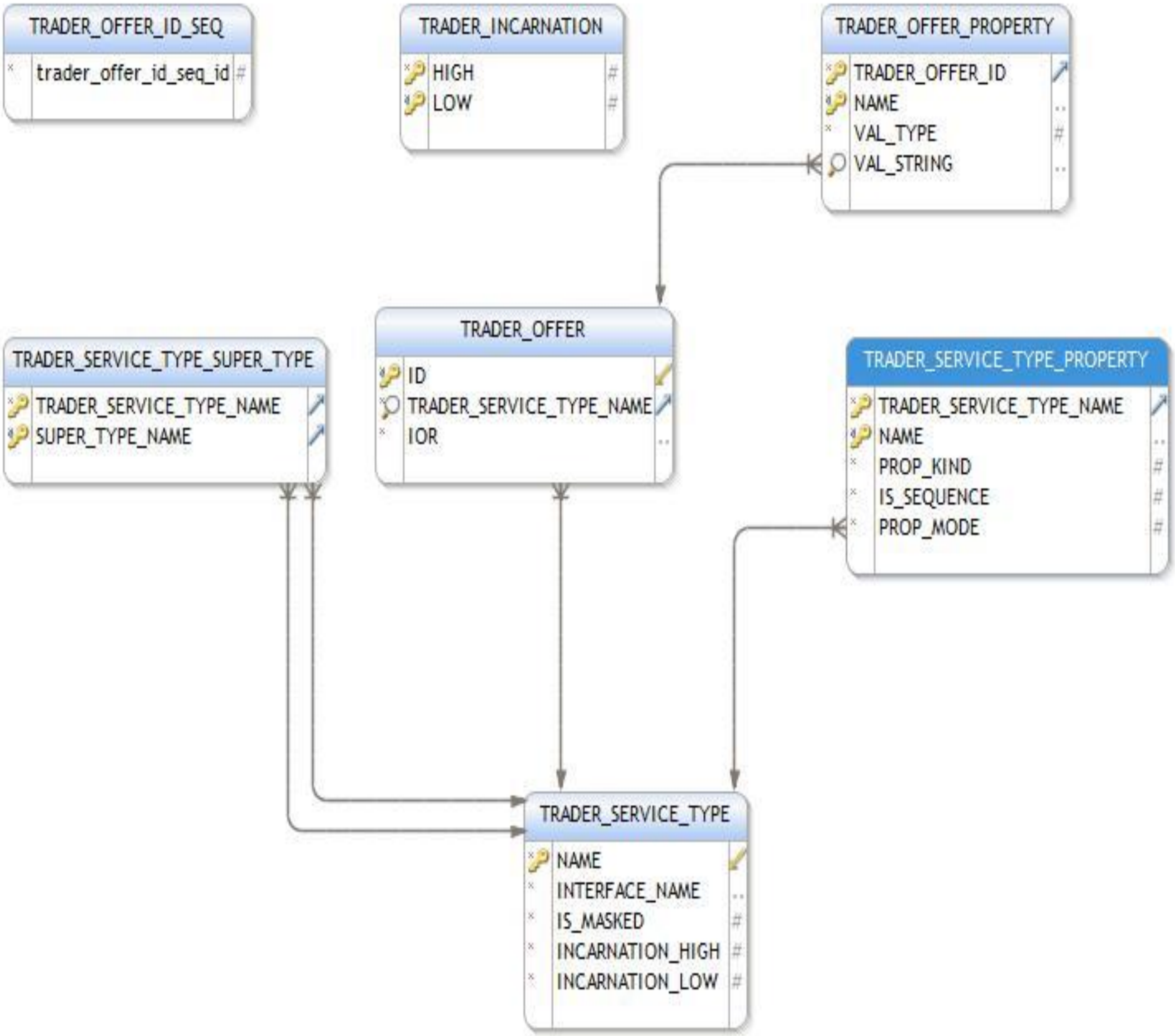
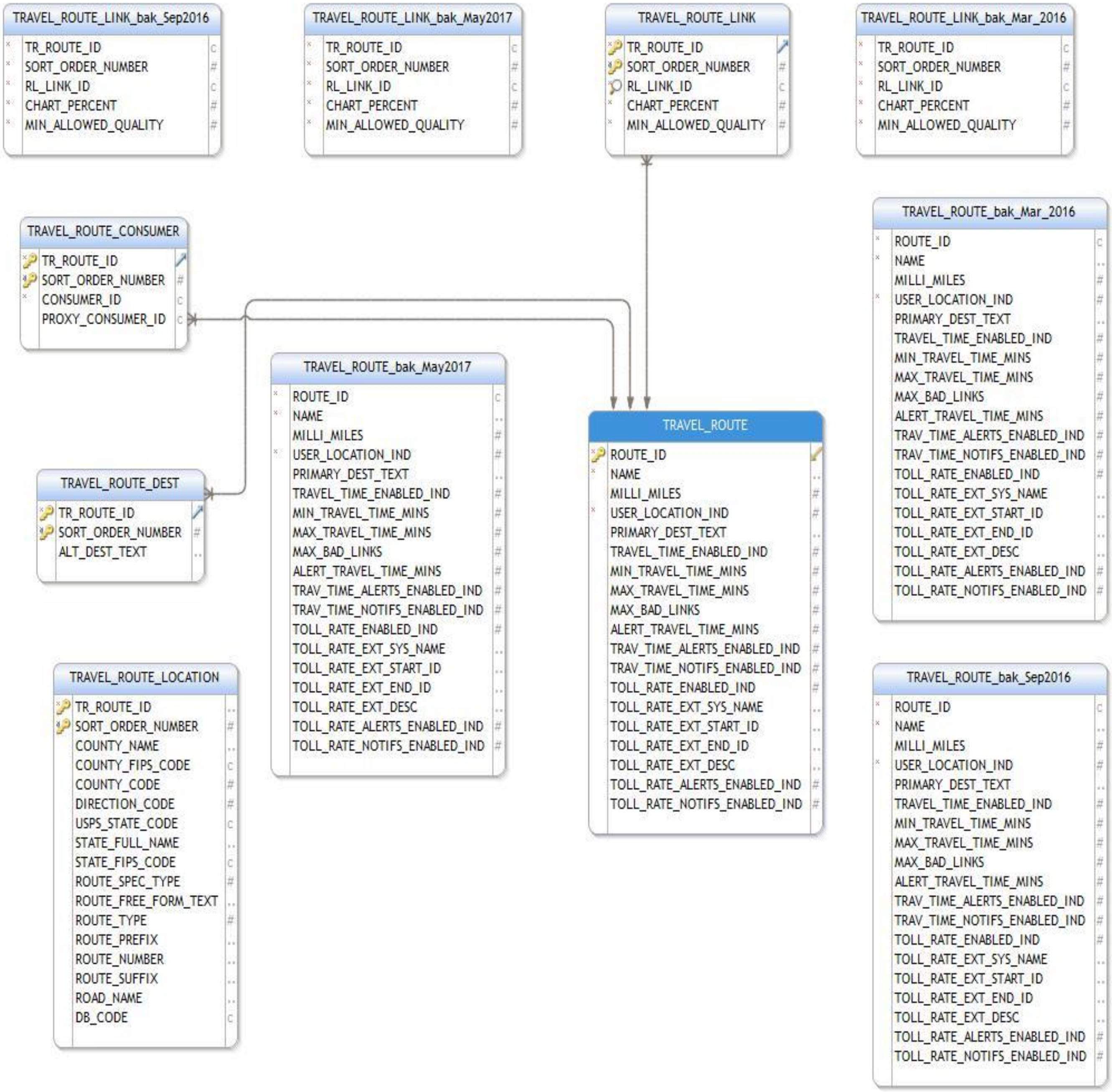
CAMERA_DEVICE_ID c
SEQ_NUM #
PRESET #
CREATED_TIMESTAMP d
DELETED_TIMESTAMP d
DB_CODE ..
TOLL_RATE_ROUTES
TOLL_RATE_EXT_SYS_NAME ..
TOLL_RATE_EXT_START_ID ..
TOLL_RATE_EXT_END_ID ..
TOLL_RATE_EXT_DESC ..
LAST_RECEIVED_TIME d
TOLL_RAW_DATA
TOLL_DATA_IMPORT_ID
EXT_SYS_START_ID ..
EXT_SYS_END_ID ..
EXT_SYS_ROUTE_DESC ..
TOLL_RATE_EFF_TIME d
TOLL_RATE_EXP_TIME d
TOLL_RATE_CENTS #
TOUR_STATUS
TOUR_TOUR_ID c
MON_DEVICE_ID c
TMP_Duplicate_ALL_LINK_TRAVEL_TIME_11232016
RL_LINK_ID c
LINK_TRAVEL_TIME_EFF_TIME d
LINK_TRAVEL_TIME_SECS #
LINK_TRAVEL_TIME_QUAL #
LINK_TRAVEL_TIME_TREND #
TOLL_DATA_IMPORT
IMPORT_ID
SYSTEM_TIMESTAMP d
EXT_SYS_NAME ..
TMP_Duplicate_PK_LINK_TRAVEL_TIME_11232016
RL_LINK_ID c
LINK_TRAVEL_TIME_EFF_TIME d
TOUR
TOUR_ID c
TOUR_CONFIG_ID c
TOUR_NAME ..
DWELL_TIME #
CREATED_TIMESTAMP d
DELETED_TIMESTAMP d
DB_CODE ..
CATEGORY ..


TRADER_OFFER_ID_SEQ
trader_offer_id_seq_id
TRADER_INCARNATION
HIGH
LOW
TRADER_OFFER_PROPERTY
TRADER_OFFER_ID
NAME
VAL_TYPE
VAL_STRING
TRADER_SERVICE_TYPE_SUPER_TYPE
TRADER_SERVICE_TYPE_NAME
SUPER_TYPE_NAME
TRADER_OFFER
ID
TRADER_SERVICE_TYPE_NAME
IOR
TRADER_SERVICE_TYPE_PROPERTY
TRADER_SERVICE_TYPE_NAME
NAME
PROP_KIND
IS_SEQUENCE
PROP_MODE
TRADER_SERVICE_TYPE
NAME
INTERFACE_NAME
IS_MASKED
INCARNATION_HIGH
INCARNATION_LOW


TRAVEL_ROUTE_LINK_bak_Sep2016
TR_ROUTE_ID
SORT_ORDER_NUMBER
RL_LINK_ID
CHART_PERCENT
MIN_ALLOWED_QUALITY
TRAVEL_ROUTE_LINK_bak_May2017
TR_ROUTE_ID
SORT_ORDER_NUMBER
RL_LINK_ID
CHART_PERCENT
MIN_ALLOWED_QUALITY
TRAVEL_ROUTE_LINK
TR_ROUTE_ID
SORT_ORDER_NUMBER
RL_LINK_ID
CHART_PERCENT
MIN_ALLOWED_QUALITY
TRAVEL_ROUTE_LINK_bak_Mar_2016
TR_ROUTE_ID
SORT_ORDER_NUMBER
RL_LINK_ID
CHART_PERCENT
MIN_ALLOWED_QUALITY
TRAVEL_ROUTE_CONSUMER
TR_ROUTE_ID
SORT_ORDER_NUMBER
CONSUMER_ID
PROXY_CONSUMER_ID
TRAVEL_ROUTE_bak_Mar_2016
ROUTE_ID
NAME
MILLI_MILES
USER_LOCATION_IND
PRIMARY_DEST_TEXT
TRAVEL_TIME_ENABLED_IND
MIN_TRAVEL_TIME_MINS
MAX_TRAVEL_TIME_MINS
MAX_BAD_LINKS
ALERT_TRAVEL_TIME_MINS
TRAV_TIME_ALERTS_ENABLED_IND
TRAV_TIME_NOTIFS_ENABLED_IND
TOLL_RATE_ENABLED_IND
TOLL_RATE_EXT_SYS_NAME
TOLL_RATE_EXT_START_ID
TOLL_RATE_EXT_END_ID
TOLL_RATE_EXT_DESC
TOLL_RATE_ALERTS_ENABLED_IND
TOLL_RATE_NOTIFS_ENABLED_IND
TRAVEL_ROUTE_bak_May2017
ROUTE_ID
NAME
MILLI_MILES
USER_LOCATION_IND
PRIMARY_DEST_TEXT
TRAVEL_TIME_ENABLED_IND
MIN_TRAVEL_TIME_MINS
MAX_TRAVEL_TIME_MINS
MAX_BAD_LINKS
ALERT_TRAVEL_TIME_MINS
TRAV_TIME_ALERTS_ENABLED_IND
TRAV_TIME_NOTIFS_ENABLED_IND
TOLL_RATE_ENABLED_IND
TOLL_RATE_EXT_SYS_NAME
TOLL_RATE_EXT_START_ID
TOLL_RATE_EXT_END_ID
TOLL_RATE_EXT_DESC
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TOLL_RATE_NOTIFS_ENABLED_IND
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TR_ROUTE_ID
SORT_ORDER_NUMBER
ALT_DEST_TEXT
TRAVEL_ROUTE
ROUTE_ID
NAME
MILLI_MILES
USER_LOCATION_IND
PRIMARY_DEST_TEXT
TRAVEL_TIME_ENABLED_IND
MIN_TRAVEL_TIME_MINS
MAX_TRAVEL_TIME_MINS
MAX_BAD_LINKS
ALERT_TRAVEL_TIME_MINS
TRAV_TIME_ALERTS_ENABLED_IND
TRAV_TIME_NOTIFS_ENABLED_IND
TOLL_RATE_ENABLED_IND
TOLL_RATE_EXT_SYS_NAME
TOLL_RATE_EXT_START_ID
TOLL_RATE_EXT_END_ID
TOLL_RATE_EXT_DESC
TOLL_RATE_ALERTS_ENABLED_IND
TOLL_RATE_NOTIFS_ENABLED_IND
TRAVEL_ROUTE_LOCATION
TR_ROUTE_ID
SORT_ORDER_NUMBER
COUNTY_NAME
COUNTY_FIPS_CODE
COUNTY_CODE
DIRECTION_CODE
USPS_STATE_CODE
STATE_FULL_NAME
STATE_FIPS_CODE
ROUTE_SPEC_TYPE
ROUTE_FREE_FORM_TEXT
ROUTE_TYPE
ROUTE_PREFIX
ROUTE_NUMBER
ROUTE_SUFFIX
ROAD_NAME
DB_CODE
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PRIMARY_DEST_TEXT
TRAVEL_TIME_ENABLED_IND
MIN_TRAVEL_TIME_MINS
MAX_TRAVEL_TIME_MINS
MAX_BAD_LINKS
ALERT_TRAVEL_TIME_MINS
TRAV_TIME_ALERTS_ENABLED_IND
TRAV_TIME_NOTIFS_ENABLED_IND
TOLL_RATE_ENABLED_IND
TOLL_RATE_EXT_SYS_NAME
TOLL_RATE_EXT_START_ID
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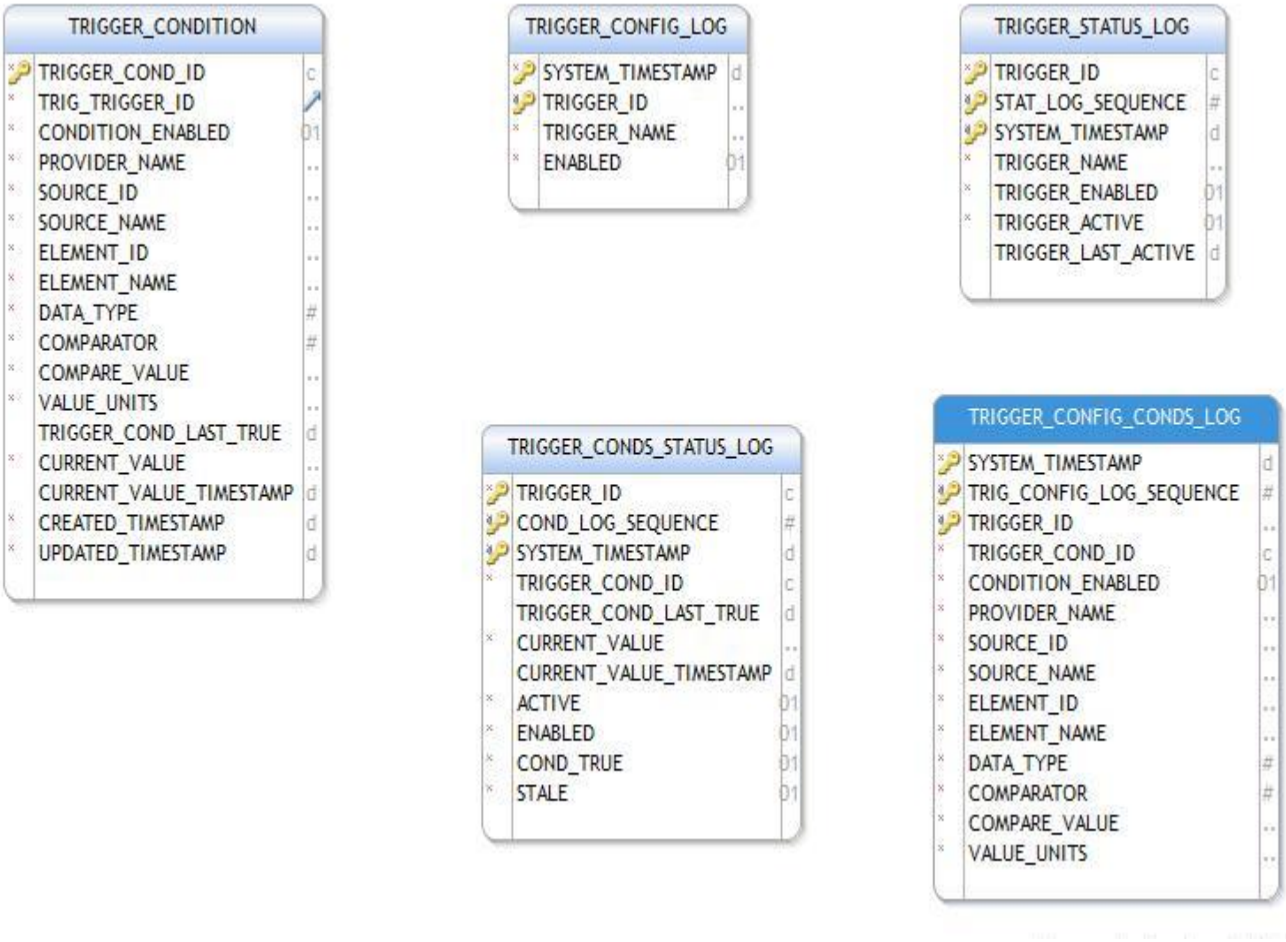
TOLL_RATE_EXT_DESC
TOLL_RATE_ALERTS_ENABLED_IND
TOLL_RATE_NOTIFS_ENABLED_IND



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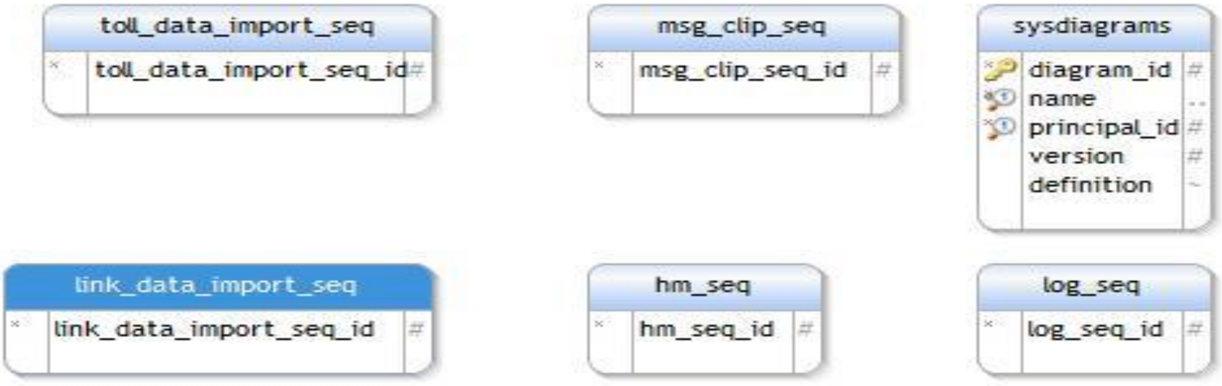
|---|---|
| TRIGGER_COND_ID | c |
| TRIG_TRIGGER_ID | |
| CONDITION_ENABLED | 01 |
| PROVIDER_NAME | .. |
| SOURCE_ID | .. |
| SOURCE_NAME | .. |
| ELEMENT_ID | .. |
| ELEMENT_NAME | .. |
| DATA_TYPE | # |
| COMPARATOR | # |
| COMPARE_VALUE | .. |
| VALUE_UNITS | .. |
| TRIGGER_COND_LAST_TRUE | d |
| CURRENT_VALUE | .. |
| CURRENT_VALUE_TIMESTAMP | d |
| CREATED_TIMESTAMP | d |
| UPDATED_TIMESTAMP | d |

| TRIGGER_CONFIG_LOG | |
|---|---|
| SYSTEM_TIMESTAMP | d |
| TRIGGER_ID | .. |
| TRIGGER_NAME | .. |
| ENABLED | 01 |

| TRIGGER_STATUS_LOG | |
|---|---|
| TRIGGER_ID | c |
| STAT_LOG_SEQUENCE | # |
| SYSTEM_TIMESTAMP | d |
| TRIGGER_NAME | .. |
| TRIGGER_ENABLED | 01 |
| TRIGGER_ACTIVE | 01 |
| TRIGGER_LAST_ACTIVE | d |

| TRIGGER_CONDS_STATUS_LOG | |
|---|---|
| TRIGGER_ID | c |
| COND_LOG_SEQUENCE | # |
| SYSTEM_TIMESTAMP | d |
| TRIGGER_COND_ID | c |
| TRIGGER_COND_LAST_TRUE | d |
| CURRENT_VALUE | .. |
| CURRENT_VALUE_TIMESTAMP | d |
| ACTIVE | 01 |
| ENABLED | 01 |
| COND_TRUE | 01 |
| STALE | 01 |

| TRIGGER_CONFIG_CONDS_LOG | |
|---|---|
| SYSTEM_TIMESTAMP | d |
| TRIG_CONFIG_LOG_SEQUENCE | # |
| TRIGGER_ID | .. |
| TRIGGER_COND_ID | c |
| CONDITION_ENABLED | 01 |
| PROVIDER_NAME | .. |
| SOURCE_ID | .. |
| SOURCE_NAME | .. |
| ELEMENT_ID | .. |
| ELEMENT_NAME | .. |
| DATA_TYPE | # |
| COMPARATOR | # |
| COMPARE_VALUE | .. |
| VALUE_UNITS | .. |



| toll_data_import_seq | |
|---|---|
| toll_data_import_seq_id | # |

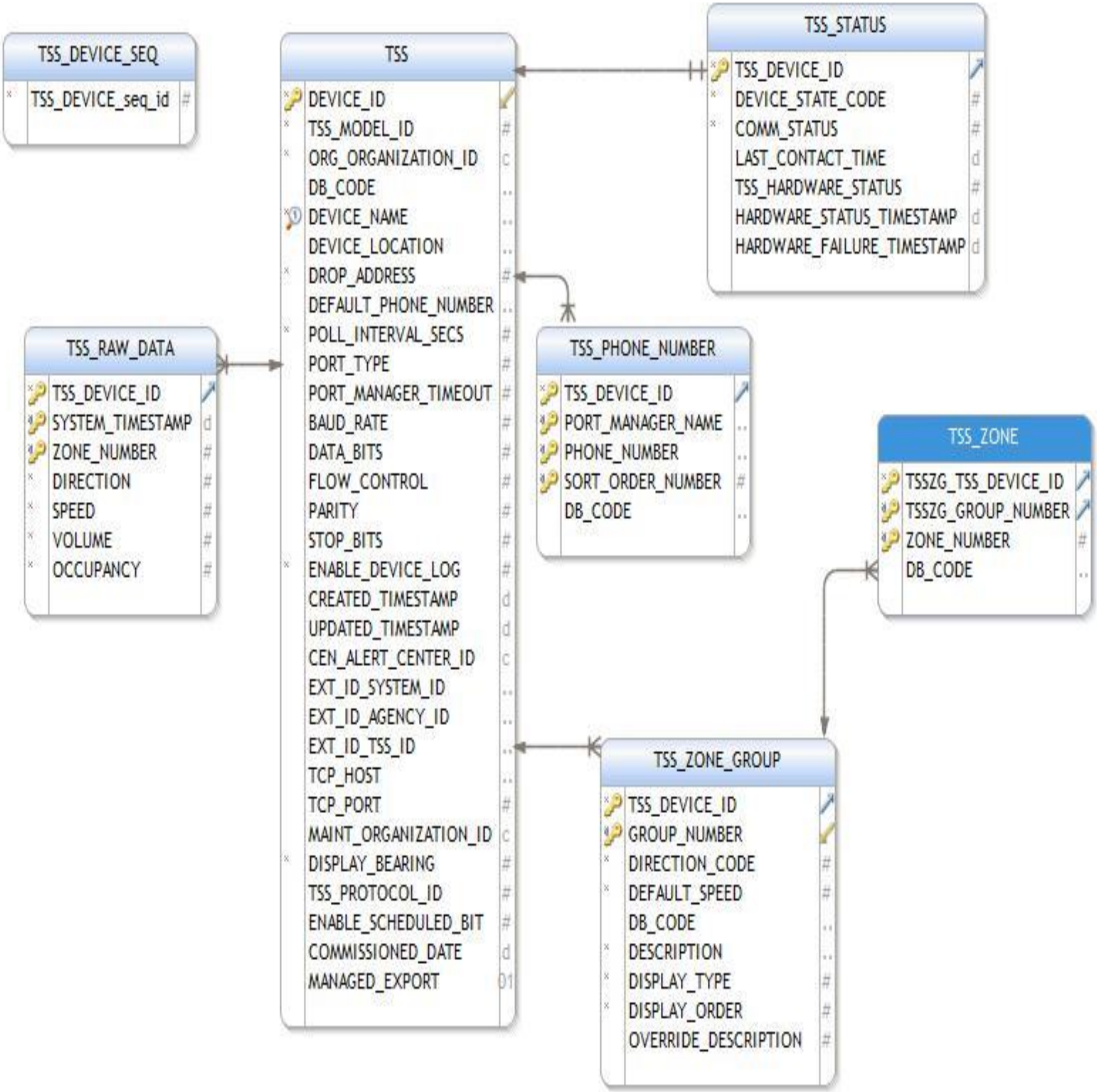
| msg_clip_seq | |
|---|---|
| msg_clip_seq_id | # |

| sysdiagrams | |
|---|---|
| diagram_id | # |
| name | .. |
| principal_id | # |
| version | # |
| definition | ~ |

| link_data_import_seq | |
|---|---|
| link_data_import_seq_id | # |

| hm_seq | |
|---|---|
| hm_seq_id | # |

| log_seq | |
|---|---|
| log_seq_id | # |


TSS_DEVICE_SEQ
TSS_DEVICE_seq_id
TSS
DEVICE_ID
TSS_MODEL_ID
ORG_ORGANIZATION_ID
DB_CODE
DEVICE_NAME
DEVICE_LOCATION
DROP_ADDRESS
DEFAULT_PHONE_NUMBER
POLL_INTERVAL_SECS
PORT_TYPE
PORT_MANAGER_TIMEOUT
BAUD_RATE
DATA_BITS
FLOW_CONTROL
PARITY
STOP_BITS
ENABLE_DEVICE_LOG
CREATED_TIMESTAMP
UPDATED_TIMESTAMP
CEN_ALERT_CENTER_ID
EXT_ID_SYSTEM_ID
EXT_ID_AGENCY_ID
EXT_ID_TSS_ID
TCP_HOST
TCP_PORT
MAINT_ORGANIZATION_ID
DISPLAY_BEARING
TSS_PROTOCOL_ID
ENABLE_SCHEDULED_BIT
COMMISSIONED_DATE
MANAGED_EXPORT
TSS_STATUS
TSS_DEVICE_ID
DEVICE_STATE_CODE
COMM_STATUS
LAST_CONTACT_TIME
TSS_HARDWARE_STATUS
HARDWARE_STATUS_TIMESTAMP
HARDWARE_FAILURE_TIMESTAMP
TSS_RAW_DATA
TSS_DEVICE_ID
SYSTEM_TIMESTAMP
ZONE_NUMBER
DIRECTION
SPEED
VOLUME
OCCUPANCY
TSS_PHONE_NUMBER
TSS_DEVICE_ID
PORT_MANAGER_NAME
PHONE_NUMBER
SORT_ORDER_NUMBER
DB_CODE
TSS_ZONE
TSSZG_TSS_DEVICE_ID
TSSZG_GROUP_NUMBER
ZONE_NUMBER
DB_CODE
TSS_ZONE_GROUP
TSS_DEVICE_ID
GROUP_NUMBER
DIRECTION_CODE
DEFAULT_SPEED
DB_CODE
DESCRIPTION
DISPLAY_TYPE
DISPLAY_ORDER
OVERRIDE_DESCRIPTION

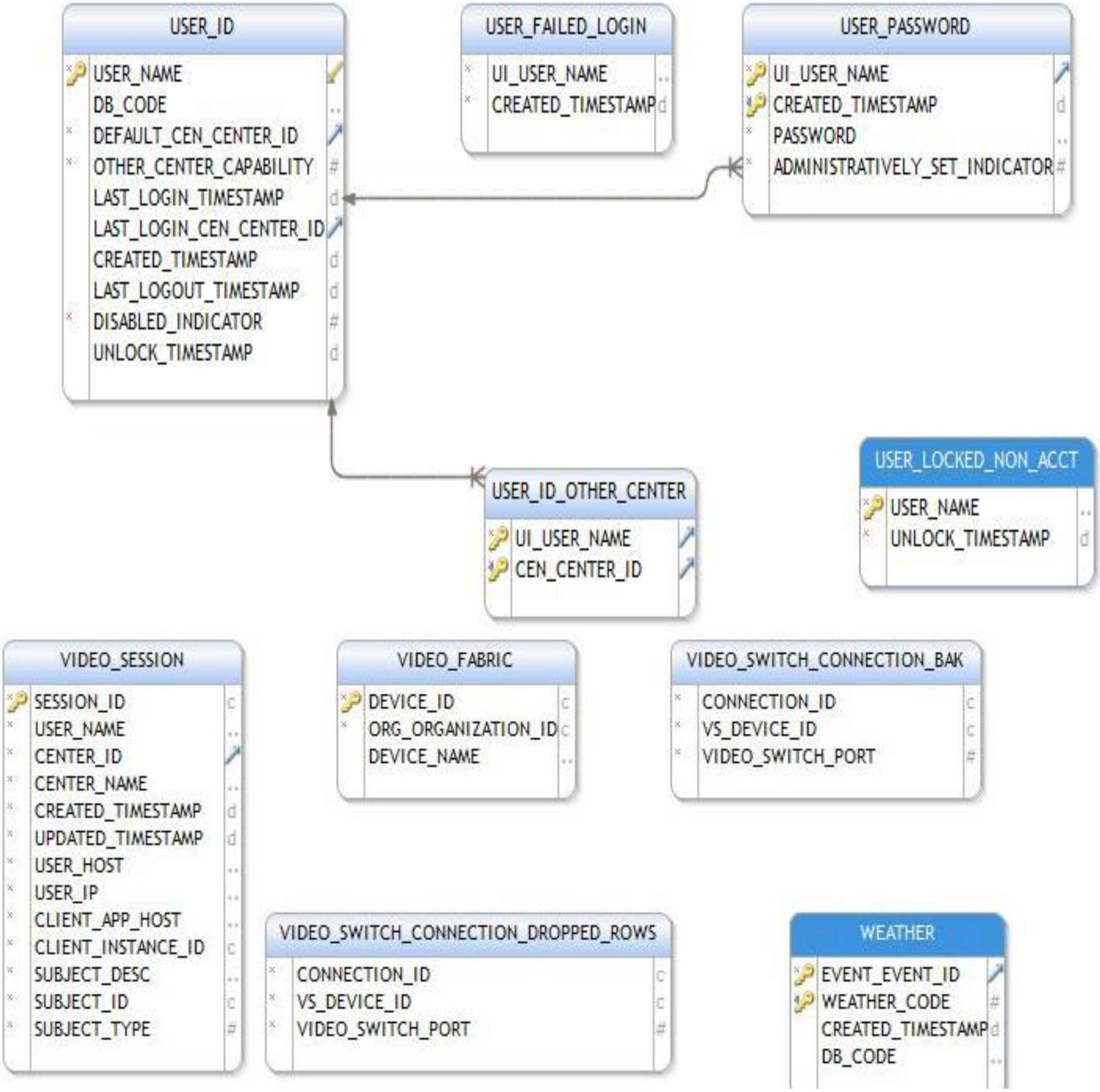


**Figure 3-2. CHART_Live ERD**

Appendix B  CHART Archive Database Entity Relationship Diagram (ERD)

There were no changes to the CHART_Archive database schema for R18.1.

Appendix C Function to Entity Matrix Report

The Create, Retrieve, Update, Delete (CRUD) matrix cross-references business functions to entities and shows the use of the entities by those functions. This report is generated as part of the CHART O&M Guide.

Appendix D Table Definition Report –

In tables shown below:

- Deleted columns/constraints marked with a minus sign (“-”)
- Modified columns/constraints marked with an asterisk (“*”)
- New columns/constraints marked with a plus sign (“+”)

No tables are modified for CHART ATMS R18.1

#### *3.1.1.2.1.1 Database Conversion*

There are no data conversion / migration tasks identified for CHART ATMS R18.1.

#### *3.1.1.2.1.2 PL/SQL Module Definition and Database Trigger Reports*

There are no new PL/SQL modules for CHART ATMS R18.1.

#### *3.1.1.2.1.3 Database Size Estimate - provides size estimate of current design*

CHART ATMS R18.1 does not affect the size of the CHART ATMS database.

#### *3.1.1.2.1.4 Data Distribution*

There are no changes to data distribution for R18.1.

#### *3.1.1.2.1.5 Database Replication*

Database replication is not used in R18.1.

Appendix E Database Failover Strategy

There are no changes to the database failover strategy for R18.1.

Appendix F Reports

Since R5, the CHART reporting function has been transferred to University of Maryland and is beyond the scope of this document.

## 3.2 Non-Database Management System Files

The following describes any updates to application data files (used for input or output), that are non-DBMS.

### 3.2.1 ATMS

The following describes the use of flat files in CHART ATMS.

#### *3.2.1.1 Service Registration Files*

There are no changes to service registration files for CHART ATMS R18.1.

#### *3.2.1.2 Service Property Files*

Service property files are organized the same for CHART ATMS R18.1 as previously. (There are no new property files, though various changes are necessary for some of the files.)

#### *3.2.1.3 GUI Property Files*

The GUI properties file is located in the WEB-INF directory for CHART ATMS R18.1. There are various changes to the properties defined therein.

#### *3.2.1.4 Device Logs*

There are no changes to Device Log Files for CHART ATMS R18.1.

#### *3.2.1.5 Service Process Logs*

All CHART ATMS services write to a process log, used to provide a historical record of activity undertaken by the services. These logs are occasionally referenced by software engineering personnel to diagnose a problem or reconstruct a sequence of events leading to a particular anomalous situation. These logs are automatically deleted by the system after a set period of time defined by the service’s properties file, so they do not accumulate infinitely. These files are stored in the individual service directories and are named by the service name and date, plus a “.txt” extension. These logs are typically read only by software engineering personnel. There are no changes to the organization of service process log files for CHART ATMS R18.1.

#### *3.2.1.6 Service Error Logs*

All CHART ATMS services write to an error log, used to provide detail on certain errors encountered by the services. Most messages, including most errors, are captured by the CHART ATMS software and written to the process logs, but certain messages (typically produced by the Java Virtual Machine itself, by COTS, or DLLs) cannot be captured by CHART ATMS Software and instead are captured in these "catch-all" logs. Errors stored in these logs are typically problems resulting from a bad installation; once the system is up and running, errors rarely appear in these error logs. Debugging information from the JacORB COTS, which is not usually indicative of errors, can routinely be found in these error logs, as well. These log files can be reviewed by software engineering personnel to diagnose an installation problem or other type of problem. These logs are automatically deleted by the system after a set period of time defined by the service's properties file, so they do not accumulate infinitely. These files are stored in the individual service directories and are named by the service name and date, plus an ".err" extension. These logs are typically read only by software engineering personnel. There are no changes for service error logs for R18.1 features.

#### *3.2.1.7 GUI Process Logs*

Like the CHART background services, the CHART ATMS GUI service also writes to a process log file, used to provide a historical record of activity undertaken by the process. These GUI process logs are occasionally referenced by software engineering personnel to diagnose a problem or reconstruct a sequence of events leading to a particular anomalous situation. These logs are automatically deleted by the system after a set period of time defined by the GUI service's properties file, so they do not accumulate infinitely. These files are stored in the chartlite/LogFiles/ directory under the WebApps/ directory in the Apache Tomcat installation area. They are named by the service name ("chartlite") and date, plus a ".txt" extension. These logs are typically read only by software engineering personnel. Additional log files written by the Apache Tomcat system itself are stored in the log/ directory in the Apache Tomcat installation area.

- The CHART ATMS R18.1 GUI changes do not change the way the GUI process logs operate.

#### *3.2.1.8 FMS Port Configuration Files*

The CHART ATMS Communications Services read a Port Configuration file, typically named PortConfig.xml, upon startup, which indicates which ports are to be used by the service and how they are to be initialized. A Port Configuration Utility is provided which allows for addition, removal of ports and editing of initialization parameters. As indicated by the extension, these files are in XML format. This means these files are hand-editable, although the Port Configuration Utility allows for safer, more controlled editing. The Port Configuration files are typically modified only by software engineers or telecommunications engineers.

- There are no changes to this section for the any of the CHART ATMS R18.1 features.

#### *3.2.1.9 Watchdog Configuration Files*

The Watchdog service uses XML configuration files to specify what actions to take for each ATMS service. There are no changes to the Watchdog configuration files for CHART ATMS R18.1.

# 4 HUMAN-MACHINE INTERFACE

## 4.1 ATMS-3108: ATMS GUI: Replace JWPlayer with VideoJS

This PR replaces JWPlayer with VideoJS. The change should be mostly transparent to the user, except for the internal controls within the player, which are visually different than JWPlayer.

### Context Menu

VideoJS is similar to JWPlayer in that right clicking on the video reveals a context menu which can be used to verify which player product (e.g., VideoJS) is being used; and the videojs-swf Flash binary version is also displayed. (The VideoJS library version is not displayed, nor is the videojs-flash plugin library version). The "(CHART)" appended to the version indicates that the SWF is custom built for CHART (to support a configurable buffer time), as described in the Key Design Concepts section.

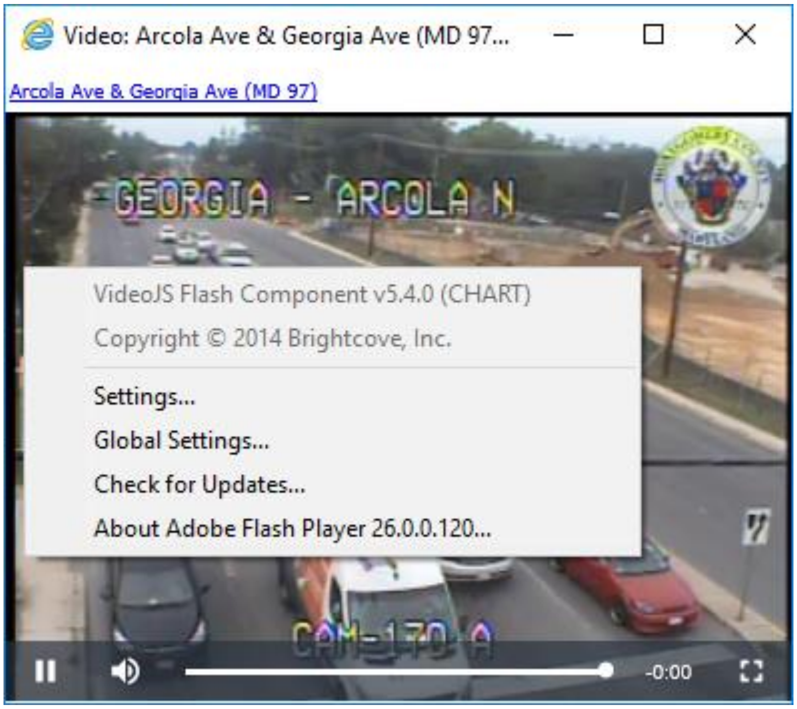

Video: Arcola Ave & Georgia Ave (MD 97...
Arcola Ave & Georgia Ave (MD 97)
GEORGIA - ARCOLA N
VideoJS Flash Component v5.4.0 (CHART)
Copyright © 2014 Brightcove, Inc.
Settings...
Global Settings...
Check for Updates...
About Adobe Flash Player 26.0.0.120...
CAM-170 A
-0:00

**Figure 4-1 VideoJS Flash Plugin Context Menu**

### Controls

Both VideoJS and JWPlayer have controls at the bottom of the window, appearing when the mouse cursor moves within the window and fading away after the cursor leaves or stops moving. The functionality of the controls is the same (both contain Pause, Volume, and Fullscreen controls), and each player pauses / resumes when the video itself is clicked on. The controls are a different visually however, as can be seen in the screenshots below.

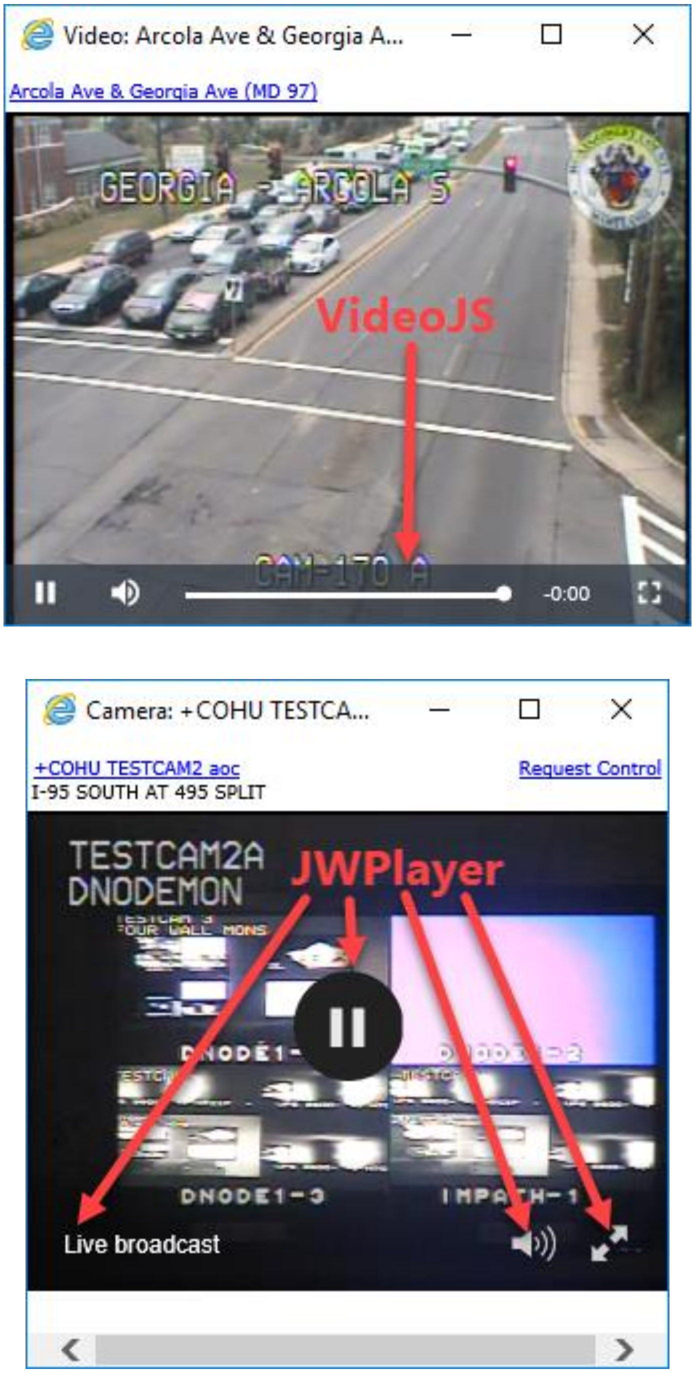
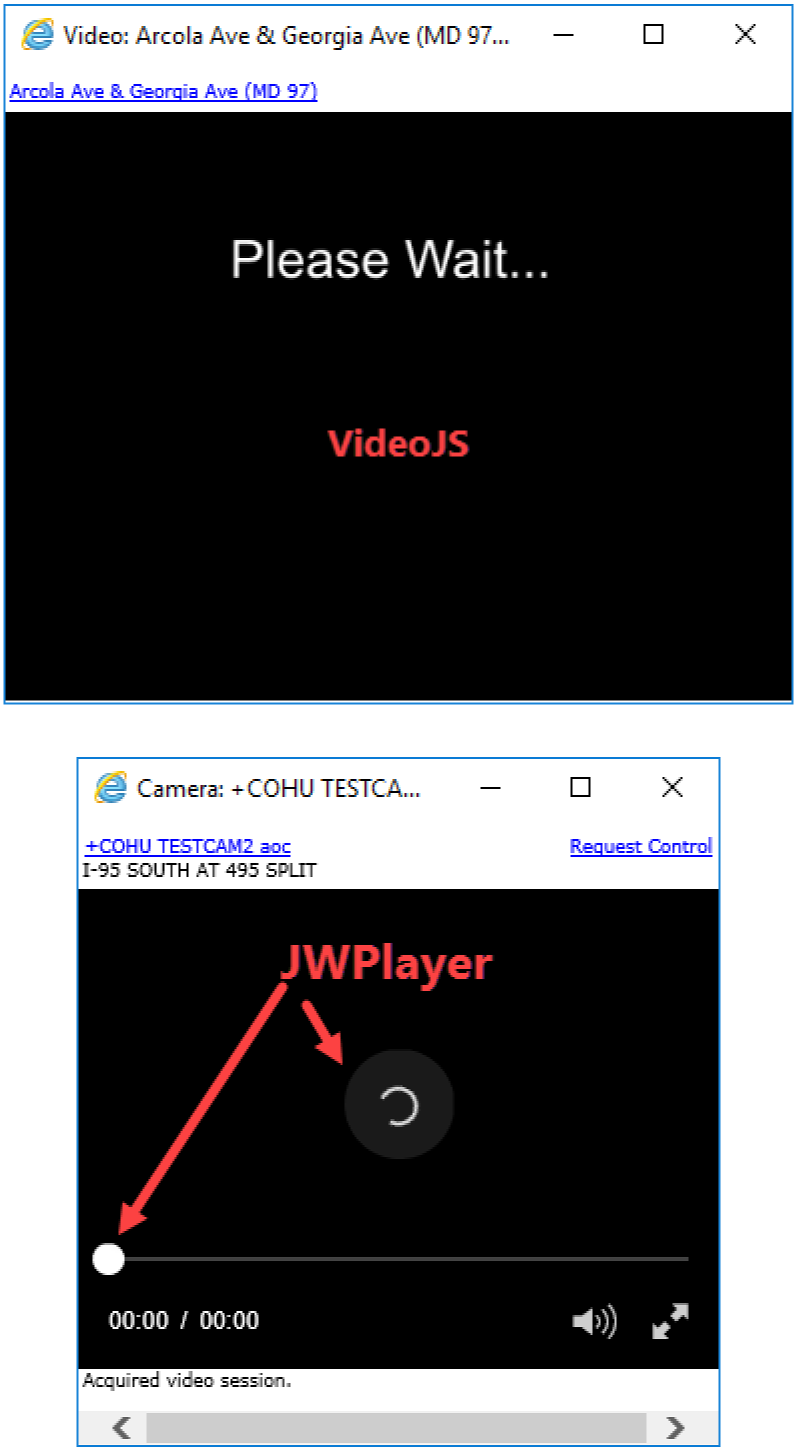


**Figure 4-2 VideoJS vs. JWPlayer controls**

Both players support fullscreen mode, and their controls remain mostly the same when in fullscreen mode.  In Fullscreen mode, both players support returning to non-fullscreen by pressing the Escape key or clicking on the un-Fullscreen control at the bottom right.

**Loading**

There are also visual differences when initially loading the video, as shown below:



Acquired video session.

**Figure 4-3 VideoJS vs. JWPlayer Loading**

**Video Status Text**

The CHART ATMS GUI displays status text received from the video player when viewing a video tour. It displays the status next to the name of the video source.

In R18, the GUI displayed status text such as “LOADING”, “BUFFERING”, “PAUSED” (there was no “PLAYING” displayed as that is the expected state). These status values corresponded to corresponding state change events triggered by JWPlayer.

In R18.1, it still displays status text, but the values are different. VideoJS is a little different in that conforms to the HTML5 video element events, and there are many more possible events, but for example,“BUFFERING” is not one of them (it looks like it might be replaced by “loadstart”). In R18.1, the ATMS GUI listens for as many of these events as possible, and shows the event name as status when they are received.

# 5 DETAILED DESIGN

## 5.1 Hardware Detailed Design

There is no new hardware (servers, devices, etc.) deployed that is related to ATMS R18.1.

## 5.2 Software Detailed Design

### 5.2.1 Key Design Concepts

This section describes key design concepts for ATMS R18.1.

#### *5.2.1.1 ATMS-3108: ATMS GUI: Replace JWPlayer with VideoJS*

For desktop video, VideoJS will replace JWPlayer in R18.1. The reasons for this are:

1. Get rid of licensing costs associated with JWPlayer
2. Remove the "phone home" functionality that JWPlayer has where it makes calls across the Internet for licensing and to support Google Analytics
3. Provide an upgrade path for the future to a non-Flash protocol (with the understanding that for now, RTMP protocol is needed for low latency video streams)

The ATMS GUI's existing video player functionality is isolated to a single JavaScript file: DesktopVideoView.js, to separate the low-level "view" from the higher-level "controller" which contains more application logic. The view has the following functionality that is used by the controller:

- getSourceURL()
- isPaused()
- isPlaying()
- setSourceURL(url)
- showNVA(optReason, optVideoSessionStatus)

As the video player is very isolated, only the implementation of this view class needs to change for R18.1. Both JWPlayer and VideoJS are set up similarly: they each have a setup call, and event handlers are registered to handle events. Therefore, even within the view, much of the logic can remain untouched. There is no real design needed; it is almost entirely an implementation task.

One difference between the players is that VideoJS does not support specifying the buffer time (i.e., the amount of time video accumulates before being displayed) for RTMP streaming. The buffer time is hard coded to 1.0 seconds in videojs-swf. At 1.0 seconds, the video can appear choppy, where vehicles jump several feet. This issue is documented, and a simple fix has been implemented here: https://github.com/videojs/video-js-swf/pull/207 .

There is an existing feature in the ATMS GUI that allows the buffer time default to be specified (in the GUI props file), and the user can override it in the User Preferences. The GUI default is 1.3 seconds, which is smoother than 1.0 seconds. To avoid losing this functionality, a custom CHART-specific build will be done to incorporate the above fix. It is likely that in some future version of videojs-swf, this fix (or another similar fix) will be merged back into the master branch. If or when that happens, the CHART-specific build can be removed, but for R18.1, the custom build is needed.

### 5.2.2 Packaging

#### *5.2.2.1 CHART ATMS*

This software design is broken into packages of related classes. Table 5-1 shows each package that is new or changed to support the Release 18.1 features.

***Table 5-1. CHART ATMS Packages***

| Package Name | Package Description |
|---|---|
| chartlite.scripts.desktopvideo | Modified for VideoJS usage (ATMS-3108) |
| charlite.scripts.videojs | Added VideoJS libraries for desktop video (ATMS-3108) |
| chartlite.servlet | Removed support for JWPlayer license key (ATMS-3108). |
| chartlite.templates.videomgmt | Modified template to support VideoJS (ATMS-3108) |
| install | Removed support for buffer time setting and JWPlayer licence key (ATMS-3108) |

### 5.2.3 Assumptions and Constraints

#### 5.2.3.1 ATMS-3108: ATMS GUI: Replace JWPlayer with VideoJS

Assumption: VideoJS is mature enough to provide trouble-free functionality
Constraint: VideoJS currently does not support setting of the buffering time for RTMP playback without a custom build

### 5.2.4 Use Case Diagrams

Due to the simplicity of the ATMS R18.1 release, there are no Use Case Diagrams for this release.

Normally the Use Case Diagrams (UCDs) would be listed below to depict new and modified functionality for the release.

### 5.2.5 Package Designs

Because this release consists only of relatively simple and straightforward PR fixes, there are no package designs for R18.1. Normally, new and modified package designs are included in a separate document for viewing with a browser.

## 5.3 Internal Communications Detailed Design

The following diagram depicts the high-level communications/interactions among ATMS and other CHART and external components.

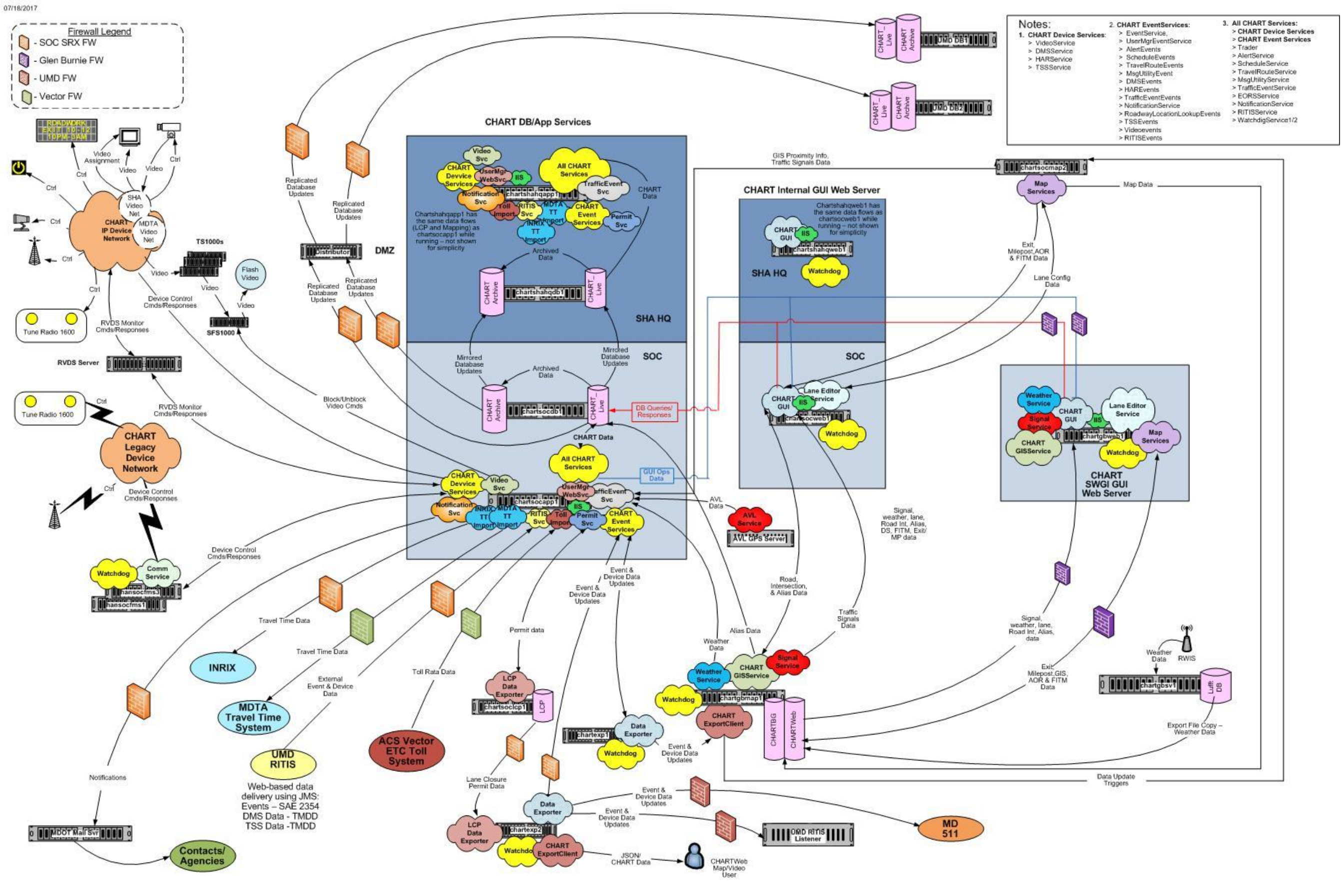


**Figure 5-1 CHART ATMS Detailed Data Flow**

# 6 EXTERNAL INTERFACES

This section describes the external interfaces utilized by CHART ATMs. There are no high-level interfaces being added or modified in Release 18.1 of CHART ATMS. See Figure 6-1.

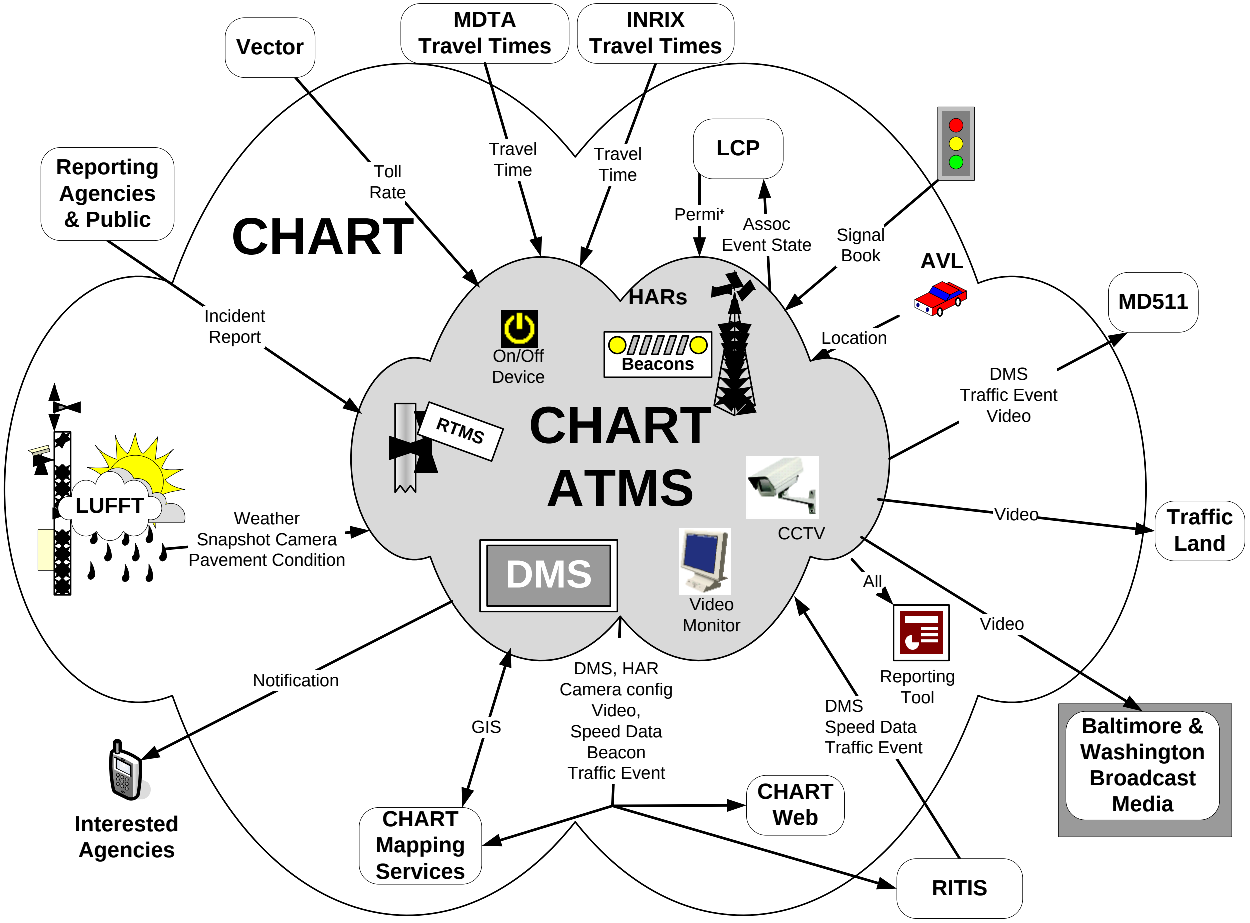


**Figure 6-1. CHART and External Interfaces**

## 6.1 Interface Architecture

For ATMS R18.1, there are no changes to the interface architecture.

## 6.2 Interface Detailed Design

For ATMS R18.1, there are no changes to the external interface designs.

# 7 SYSTEM INTEGRITY CONTROLS

This section describes the security and integrity controls being added or modified in Release 18.1 of CHART ATMS. Features being added for CHART ATMS Release 18.1 do not change security aspects of the CHART ATMS.

# Appendix A Mapping to Requirements

The table below shows how the new and modified requirements in the CHART R18.1 Requirements document map to elements contained in this design.

*Table A-1. Mapping to Requirements*

| PR | Requirement | Features | Use Case | Other Design Elements (DD refers to a Section in this Design Document) |
|---|---|---|---|---|
| ATMS-3108 | BR-1.* (see R18.1 Requirements) | N/A | N/A | DD 4.1, DD 5.2.1.1, DD 5.2.2.1, DD 5.2.3.1, DD 5.2.4.1 |